THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIX. No. 727.] LONDON, APRIL 17, 1877. [29TH YEAR.] Price 6d.

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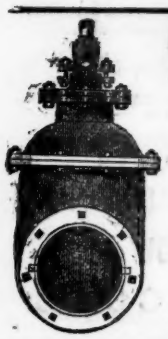

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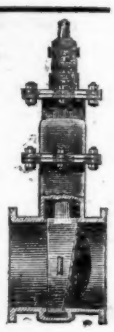

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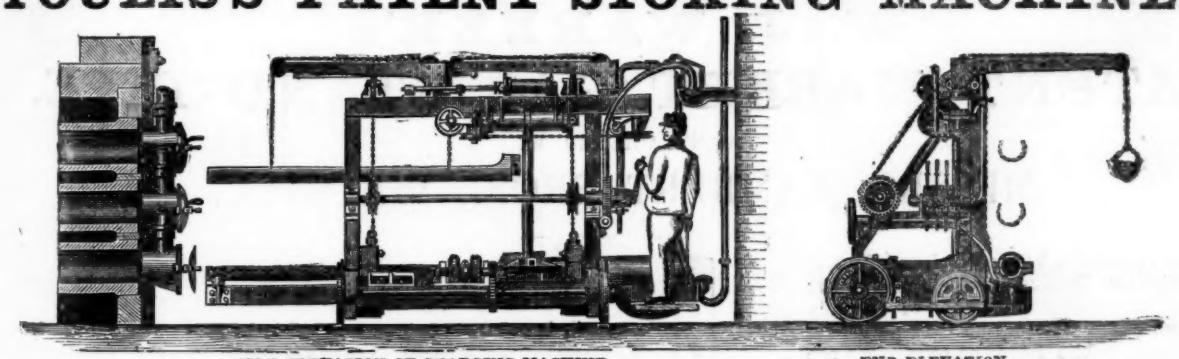

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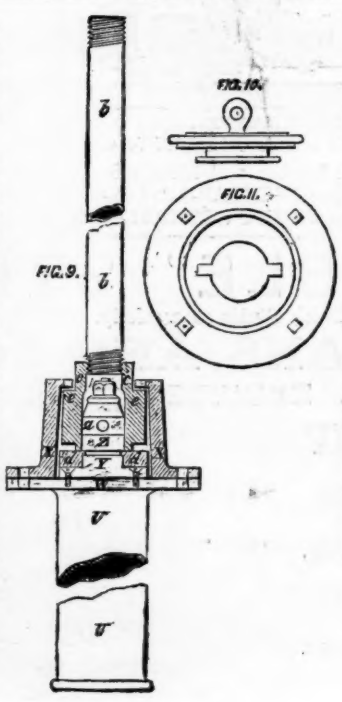

Fig. 9 represents the arrangement for the attachment of removable market or other gas stand-pipes. The view is a side elevation and part section. To the top of the service, U, is fixed a plate, W, and upon that is fastened by bolts the case or box, X. To the plate, W, is also fixed, by screws, the plug or valve, Y, and upon this plug the barrel Z is free to turn. That part of the barrel marked *a* is square. The stand-pipe, *b*, has attached to its lower end the collar, *c*, which is square in the interior, so as to slip over and turn the barrel by the square part, *a*, until the hole in the plug and that in the barrel coincide, when a gas-way will be established between the service, U, and the stand-pipe, *b*. A gas-tight joint between the collar, *c*, and the plate of the plug or valve, Y, is made by the former being forced down upon an india-rubber washer, *d*, by the upper part of the feathers, *e*, of the collar, *c*, coming in contact with inclined projections cast on the inner side of the box, X.

Fig. 10 is a plan of the top of the box or case containing the valve.

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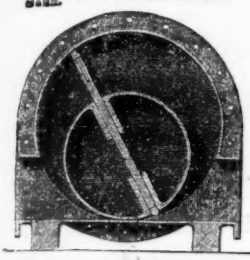

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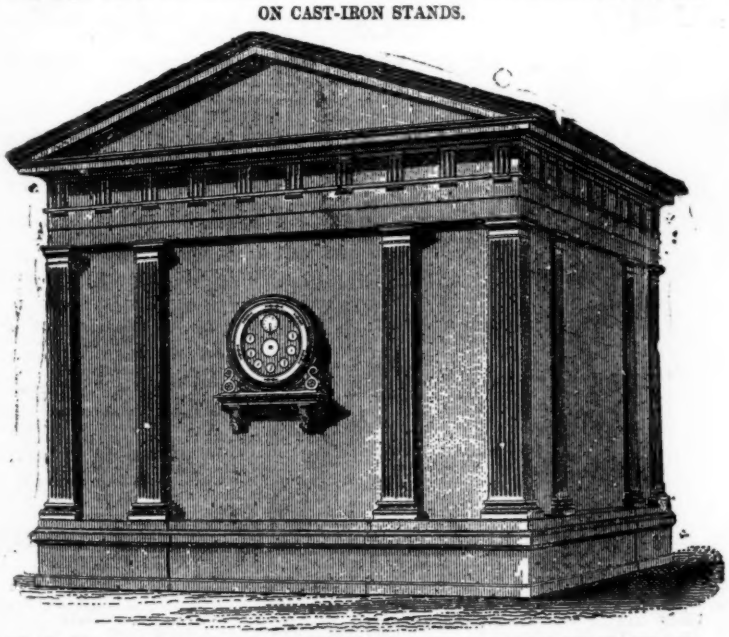

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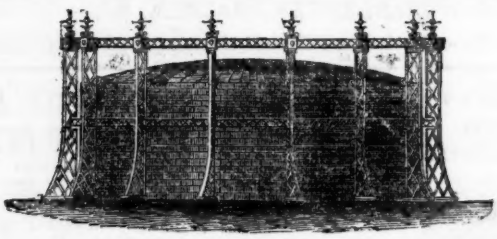

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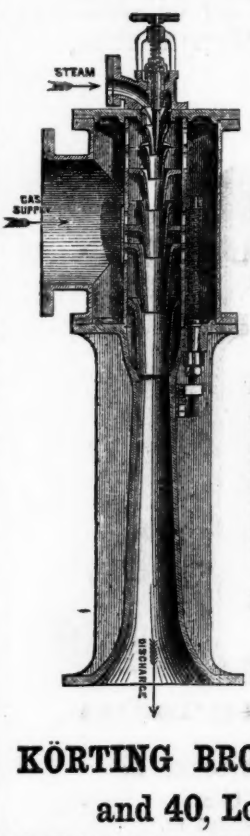

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STEAM-JET GAS-EXHAUSTER.

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Small Cost—Compactness—Perfectly Self-Acting—Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—No Extra Room Required—No Wear and Tear—No Noise—No Oscillation in Vacuum, or Back Pressure.

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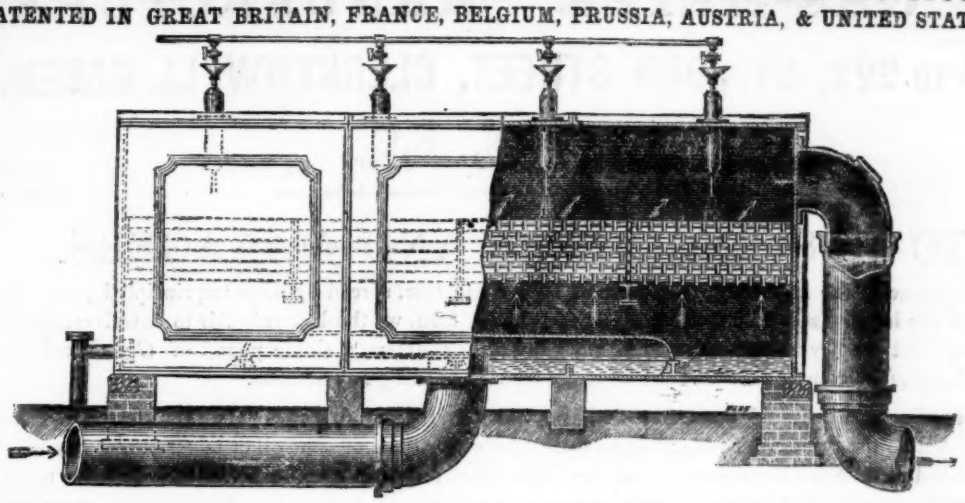
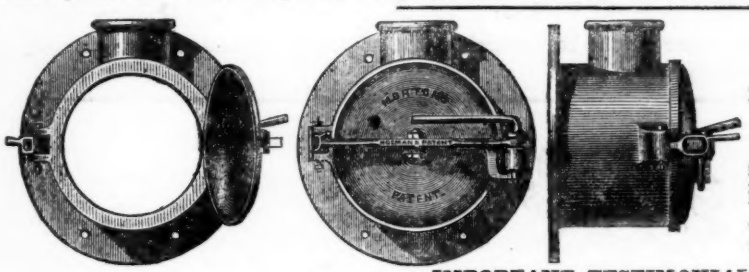
PATENTED IN GREAT BRITAIN, FRANCE, BELGIUM, PRUSSIA, AUSTRIA, & UNITED STATES.



MECHANICAL ARRANGEMENT.—The Washer Tank contains a large bottom chamber, into which the Gas is freely admitted through an ordinary full-way inlet-pipe, passing first under an inverted vessel which removes any Tar remaining in the Gas after leaving the Condenser; it then rises slowly over the whole surface, CONTAINING AN AREA OF ABOUT EIGHT TIMES THAT OF THE INLET-PIPE, through equidistant spaces in a series of Self-Sealing Water Troughs, arranged in tiers, dividing itself and passing through the various dips until it reaches the upper chamber, and from thence through the outlet-main. The washing liquid being CLEAN WATER is admitted by the Syphon inlets on top of Tank to the upper row of troughs, running through each successive tier, and becoming impregnated with the impurities extracted from the Gas, gaining strength at each dip on its descent, and finally passing off by the outlet syphon at the bottom. It will be observed that in this Scrubber-Washer the Gas comes first in contact with THE STRONGEST LIQUOR at the bottom, and passes through WEAKER LIQUOR at each successive tier, until it issues through CLEAN WATER into the upper chamber; hence the true principle of Gas Purification by Washing is simply and automatically effected.

ADVANTAGES.—Great economy in first cost and foundations; great saving of other purifying apparatus and material; occupies little space, and stands only a few feet in height; being entirely self-acting, requires no motive power either for purifying or distributing; the Gas is washed several times in ONE vessel, each time in liquor of a different strength, ultimately passing through CLEAN WATER; produces liquor of any required strength by once passing through; can be fixed (if desired) at any elevation to permit Contractors' tanks being filled without the expense of pumping.

One of these Scrubber-Washers has been in successful operation for the past twelve months at the Sowerby Bridge Gas-Works, and they are now being erected at the Corporation Gas-Works, Adderley Street, Birmingham, and at the Phœnix Gas-Works, Vauxhall, London.



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Instantaneous Sealing effected. No Luting. No Duplicate Lids required. Holman's New Self-Sustaining Cross-Bar ensures freedom of joint and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), nearly 25,000 being in use at various Gas-Works in London and the Provinces.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (commonly called the Chartered Gas Company), Beckton, North Woolwich, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them. I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly, (Signed) G. C. TREWEY.

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Andover, Birmingham, Cannes (France), Devonport, Dronfield, Dursley, Exeter, Guernsey, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

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SOLE MANUFACTURERS,

LAURENCE POUNTNEY LANE, LONDON, E.C.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

TO GAS ENGINEERS AND MANAGERS.

It having come to our knowledge that a report is in circulation, spread by some unprincipled person or persons, that the cases of our larger-sized Meters are made of Galvanized Iron, we think it only fair to ourselves, and just to our customers, to say, that we never have used, in making any of our Meters, a single pound of *Galvanized Iron*, or any other *cheap* and *inferior material*, and this can be easily seen by opening any of them.

The cases of our large-sized Meters, from 20 lights and upwards, are all made of the very *Best Best Patent Alloy*, which is nearly double the price, and will last more than double the time, of some other material that has been and still is very largely used for the same purpose. And our experience, acquired by an extensive use of it for upwards of 30 years, enables us to say with confidence that no other metal in use for the purpose is so little liable to corrosion from the action of the gas.

We have now in use a Meter made in 1848, and therefore 29 years old, the case of which is made of Patent Alloy; the Meter is still in perfect order, and shows no signs of decay.

The utmost care is exercised by us in selecting none but the very best materials for all parts of our Meters; much of it is made *expressly for us*, as it is not possible to obtain it in the open market of the same superior quality.

The great fall in the price of all materials used in making our Meters has enabled us to give an increased discount, thus giving our customers the benefit of the fall. This we were bound in fairness to do, as we raised the price of our Meters four years ago, when the price of all metals went up.

It will be our constant endeavour, by using none but the best materials, and employing the most skilful workmen, to maintain the high character our Meter has hitherto borne.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

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STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

RECEIVED.—*A. P., Lima; H. Greene and Sons, Cannon Street; N. H. Humphrys, Westbury; H. G., Preston.*

TREATISE ON GAS LIGHTING.—*The publication of these chapters will be resumed in our next number.*

SECRETARY.—*Ammoniacal liquor used in the scrubber removes a part, both of the carbonic acid and the sulphuretted hydrogen, and thus saves some amount of other purifying agents. Weak liquor also extracts ammonia.*

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 17, 1877.

Circular to Gas Companies.

As far as our industry is specially concerned, the all-absorbing question of the hour is Mr. Raikes's proposed new Standing Order for the House of Commons. Whether or not it will be adopted, will probably have been decided before these lines meet the eyes of the majority of our readers; but that need not prevent us from giving a *résumé* of gas legislation, so far as auction clauses are concerned, since 1856, before which period, we believe, such clauses were never embodied in a Gas Act. Since, and including, the year 1856, three hundred and sixty Acts, incorporating or extending the powers of Gas Companies, have been passed, and in forty-five of these, or exactly one-eighth of the whole, auction clauses, either peremptory or permissive, have been included. A detailed account of these enactments will be found in another column; but we here briefly summarize the information. In twenty-six Acts, now operative, the sales by auction are peremptorily ordered, with, in some cases, peculiar reservations, which will presently be noticed. In the other nineteen cases, the sale of shares by auction is allowed under circumstances which are specified in the enactments. It may be said, we believe, with truth, that in all these cases, except the most recent, the auction clauses were introduced voluntarily by the promoters of the Bills. The fact was, at all events, in years gone by, that the profits of Gas Companies were uncertain, and it was doubtful how far original proprietors could be relied upon to introduce the capital necessary for requisite extensions of undertakings. Under such circumstances, auction clauses invited outsiders to come into the concern, and share the risk of the venture.

Taking, first, the Acts in which the sale of all, or of only a portion, of new issues were directed to be made by auction, we find the Gainsborough Gas Act of 1856, which prescribes that one-half of the new issue shall be thus offered to the public. It is significant of the uncertainty of profit which at that date was entertained, that the Act directed that any premiums realized should be added to capital (entitled to dividend), and that discounts should be deducted from capital. We may pass over several Acts which compel sales by auction, and in general prescribe that any premiums realized shall be considered capital not entitled to dividend, noticing only the Portsea Island Gas Act, 1860, which enacted that only one-half of the new shares should be offered to the public, the other half being reserved for existing proprietors.

We come now to a period subsequent to the passing of the Companies Clauses Act, 1863, which Act we regard as the sheet-anchor of shareholders. The Salisbury Gas Act of 1864 contained auction clauses, but it prescribed that premiums realized should be expended on extensions or improvements of works. The Chesterfield Act of the following year directed that any premiums realized on public sales should be added to the reserve-fund of the Company. The same appropriation of premiums was made by the Exeter Gas Act, which directed that one-half of the new shares should be allotted to existing holders, and the rest disposed of as the directors thought fit.

In the same year, 1865, the Fareham Gas Act, containing peremptory auction clauses, was passed, and, in this instance, we find that Parliament enacted that the premiums should be deemed profits of the Company. The Aldrington and Brighton Gas Act, of the next year, directed that one-half of the shares should be offered by auction, and the other moiety disposed of as the Directors thought fit, the premiums to go to form a reserve-fund. This was an altogether abortive undertaking, not a share having been issued, and we only quote it as an illustration of the practice of Parliament. We may pass over a good many other Acts containing compulsory auction clauses, only noticing the Whitby Gas Act, 1871, which directed that the reserve price put upon shares offered by public auction should be neither more nor less than the nominal value of such shares.

We come next to the Acts which give Companies a permissive power to offer shares for sale by auction. This power is to be exercised in two different ways; the shares may be disposed of in the mode the Directors think fit, or a resolution passed at a general meeting of shareholders may ordain the sale of new issues by public auction. A pretty general similarity exists in all these enactments. They allow by implication a first claim to the new issues by existing holders, and then permit the sale of unallotted shares by auction as Directors or Proprietors think fit. In all cases it is provided that the premiums realized shall be considered as capital not entitled to dividend. But several of the Acts regulate the amount of calls to be made on the shares, and it seems clear that a share sold by auction only a small amount on which was to be called up immediately, and the rest at remote and indefinite intervals, would command but a very small premium, whatever expectations as to dividends might be entertained. In the most recent Acts, giving permissive power to sell new shares by auction—take, for example, the Gloucester Gas Act, 1871, and the Lincoln Act, 1873—it is specifically enacted they shall first be offered to existing holders at par.

There are two Acts which deserve special mention, on account of certain peculiarities in the enactments. The first is the Sowerby Bridge Gas Act, 1861, which directs that one-half of the new capital authorized shall first be offered to large consumers in the district, and if not taken up by them may be sold by auction. The second is the Worthing Gas Act, 1868, which prescribes that new capital issued by the Company shall be offered to ratepaying inhabitants before existing proprietors, and, if not taken up within a month, may be allotted to shareholders, or disposed of in any way the Directors think fit.

We have not alluded to the cases of the two Metropolitan Gas Companies whose most recent Acts contain auction clauses. In these instances, the compulsory sale of new shares by auction is accompanied by two novel provisions—first, the sliding scale of dividend; and next, the enactment that one-half of all new capital required shall be raised by way of loan, at the lowest possible rate of interest. It is probable that the first sales of new shares by these companies will realize premiums of more than one hundred per cent., which, being profitably employed as capital not entitled to dividend, must, unquestionably, tend to make the dividend on the real share capital more secure. A large proportion of loan capital, at a low rate of interest, must also have a decided effect in the same direction, and hopes are entertained that dividends will be raised far above the maximum rates formerly allowed. Coupled with such provisions, therefore, it might appear that auction clauses could fairly be made compulsory. Mr. Raikes's proposal, however, makes no mention of these. It simply commands the sale of new shares by auction, and thus deprives existing proprietors of a privilege which it was at their option to relinquish, or not, as they thought fit. It is speciously argued, in *The Times*, that the provision of the Act of 1863, for the retention of which we contend, was and is simply permissive, and is only operative "unless the company, before the issue of "new shares or stock, otherwise determine." We grant it, and only ask to be let alone. If Companies be allowed to deal with their own as they may determine, we shall be satisfied. Whatever may be said to the contrary, the Act of 1863 did confer

on Companies the right of allotting new capital to existing proprietors; and the proposal of Mr. Raikes, if adopted, would take away the privilege which we have said before will confiscate, not a small proportion of the sum paid by recent investors for shares in Gas Companies. The question to be placed before the House of Commons this evening is a very simple one. It is this: Shall a dictatorial Order, prescribing a definite enactment, which, we believe, has no precedent in the book of Standing Orders, be adopted; or shall a recommendation to Select Committees be prescribed, which will allow them to deal with the cases that present themselves, according to their merits? It is quite out of our power to go into the circumstances of the Companies whose Acts, containing auction clauses, we have detailed elsewhere. We have said that these clauses had their origin in the fact that Gas Companies, uncertain of profits, could not depend on original shareholders to supply capital for requisite extensions. They therefore sought aid outside their own community, on conditions such as we have described.

It is desirable to say a few words on the probable effects of the proposed Standing Order if it be adopted. We have hitherto, and more especially in recent times, advised all Gas Companies to apply for Acts of Incorporation or Provisional Orders. If this Order should be adopted, we shall certainly advise all unincorporated Companies to keep out of Parliament as long as they possibly can. They may be subject to annoyances and persecution, but a Company firmly established in any district, and righteously doing their duty, may defy all competition, and laugh at all Local Authorities. Parliament confers but one right, and imposes many restrictions. The right, or rather permissive power, to break up roads, may be secured in many ways; but the restrictions entailed by a Special Act cannot be avoided.

The position is delicate, and we rather hesitate to give advice. The Isle of Thanet Gas Company are pledged to proceed with their Bill; but we believe that the adoption of the Standing Order proposed will morally absolve them from the duty. An entirely new condition is proposed, of which they had no knowledge when the arrangement was entered into. Thus they may fairly withdraw their Bill, and go on as they have gone on; the more so as ratepaying Ramsgate rejects as Commissioners the candidates who would confiscate the Gas Company. Some other Bills may also be withdrawn, and thus a practical protest be made against a dictatorial Standing Order, adopted without any special knowledge of the particular circumstances in which it could be applied. At the last moment we cannot help indulging a hope that Mr. Raikes, or, rather, the permanent officials of the Board of Trade (in whose hands poor Sir Charles Adderley is simply a tool), will be defeated. Trade, as distinct from the Board of Trade, as it is called, is still powerful, as it ought to be, in the House of Commons, and we have little doubt that the participators in joint-stock enterprise will stand up against a proposal which, to-day, threatens only Gas Companies, but to-morrow may be made applicable to all incorporated companies in the kingdom.

We have much pleasure in recording the fact that the Exhibition of Gas Apparatus, opened last Monday by the South Shields Gas Company, has proved a great success. It was, from its opening till its close, crowded with visitors who all experienced the utmost satisfaction with what they saw. In another column we give a special report on the contents of the Exhibition, and the proceedings that took place in connexion therewith. We need therefore only congratulate the Directors of the Company, and their able Manager, Mr. Warner, on the complete success of the enterprise. It was well that the economic uses of gas for other than lighting purposes should be brought more fully to the knowledge of the general public; for the majority are strangely ignorant on the subject. Even in the Metropolis, where numerous shops in all directions display gas apparatus for cooking and heating purposes, a very general ignorance prevails as to their economy and value. And this ignorance is most common among the classes to whom the apparatus would be most useful. We allude to the lower middle and artizan classes. Gas-cooking stoves would be a source of economy to all classes; but when the cost of fuel is no object, and the number of servants unimportant, they may present no attractions. In small households, however, their use would prove a real blessing, and, in summer time, when no fires are required, except for cooking purposes, or for occasionally heating a flat-iron, a great saving would result from the use of gas-stoves. We indulge a hope that the Exhibition, so successful at South Shields, will be repeated in many other towns, confident that such practical displays will result in a large extension of the business of Gas Companies.

The provisional agreement made between a Committee of the Corporation of Leicester and the Directors of the Leicester Gas Company will be found in another column. It is, of course, subject to the approval of the shareholders, and the inhabitants of the borough must also be consulted under the provisions of the Borough Funds Act. There is no doubt, however, that the shareholders will accept the terms agreed upon, and no fear that the townspeople will oppose. In truth both parties make an excellent bargain. The shareholders will receive perpetual annuities equal to something more than maximum dividends, and the town acquires one of the most successful gas undertakings in the kingdom. How profitable it has been to the Company will be seen in Alderman Stafford's speech, and how promising it is to the Corporation may be gathered from the fact that the business of the Company has doubled itself in about eight years. Gas at Leicester is cheap and good. The illuminating power is about sixteen candles, and the price in the borough is from 2s. 6d. to 2s. 10d., with 6d. extra in the suburbs. That the works have been admirably managed will be seen from the following facts kindly furnished by a correspondent:—The make of gas last year was 455,255,000 cubic feet, and the quantity sold was 426,697,000 feet; the gas unaccounted for was, therefore, only a little over six per cent. The capital at present employed, £220,000, is equal to £4 13s. 10d. per ton of coal carbonized last year, 46,880 tons. A few more figures will show the immediate gain which will accrue to the Corporation by the purchase. To pay the full dividends on the Company's capital, £17,267 are required. The annuities offered by the Corporation will amount to £19,000, while the profits made by the Company last year were very little short of £28,000. There is only one point in the agreement to which we are inclined to object, and that is the disposal of the reserve-fund. We look on a reserve-fund as the property of the shareholders, but in this case it has been arranged that, *minus* £4000 for winding-up purposes, it shall go as a nest-egg to the Corporation. Altogether, however, we must regard the terms of purchase as eminently satisfactory; and, much as we regret the disappearance of the Company, we may congratulate the shareholders. The Bill of the Company, we are informed, will be proceeded with this year, with the understanding that any new capital required will be raised by way of loan. Next year the Company and Corporation will jointly promote a Purchase Bill.

We print to-day a letter from Mr. A. Vernon Harcourt, one of the Referees, on the pressure tests prescribed by that body. There are cavillers who are constantly asserting that gas testings are a mere farce. That is not our opinion, and we do not wish to see them made farcical. The suggestion of Mr. Harcourt, however, that an Examiner should make three out of six tests for pressure while he is engaged on one test for illuminating power, is, to our minds, ridiculous. A test for illuminating power, carefully made according to instructions, will occupy an Examiner about half an hour, and three pressure tests will only show the pressure within that period. Clearly, this is not what the Legislature intended. We think it a pity that the Referees did not prescribe the use of a self-registering gauge. It need not have been an expensive instrument, and its employment would have afforded exactly the information which the Legislature meant should be acquired.

The Quarterly Report of Professor Williamson, the Chief Gas Examiner, might provoke a good many remarks, but we have no space for them. It is clear that the Gas Companies continue to comply as closely as possible with the requirements of the Legislature and the Instructions of the Referees, and that the gas supply of the Metropolis, so far as it is under the observation of the Chief Gas Examiner, is in a highly satisfactory state. We read in a contemporary of great "irregularities" in the conduct of the testings being recorded; but that is a matter which only concerns the Metropolitan Board of Works. If they choose to allow the testings to degenerate into a farce, they are welcome to do so.

Water and Sanitary Notes.

THE water supply of Richmond (Surrey), notwithstanding all the exertions of the Select Vestry—and we may admit they have been great—is still in a very unsatisfactory state, and is likely to continue so. The causes appear to be two in number—first, the sources on which the Vestry at present rely are totally inadequate to furnish a satisfactory supply; and secondly, the fittings of the consumers in the lower parts of the town are so defective, that most of the water supplied runs to waste, to the loss of the inhabitants in the higher parts. Most of the defects are ascribed to the careless behaviour of plumbers; and we have little doubt that the allegation is perfectly true. No sensible man ever admits a plumber to his house, except under the pressure of dire necessity, and then has almost invariably to regret it. The fact is, that no skilled work is done so negli-

gently and carelessly as plumber's. The Vestry, no doubt, accuse the Southwark and Vauxhall Water Company of corrupting the morals of the plumbers; but we do not think the allegation could be sustained. The morals of plumbers do not need to be corrupted. But this is somewhat beside our present purpose. In view of a possible—we might say, a certain—scarcity within a short time, the Richmond Vestry have obtained permission from the Thames Conservancy Board to pump 250,000 gallons of water per day from the river, near the Petersham meadows, just below the "Star and Garter" Hotel. In the meadow, they intend to establish a filtering-bed, and from that they will have to lift the water to their reservoir. The extravagance of this proposal is most remarkable, seeing that the Southwark and Vauxhall Company have offered to put any amount of water into the reservoir at a cost of sixpence per 1000 gallons. We say nothing about the quality of the water the Vestry would take at the point they have selected, but we know that between the intake of the Southwark and Vauxhall Company and that proposed near the Petersham meadows a large amount of sewage enters the river. The inhabitants of Richmond should at once take steps to prevent the Vestry from carrying out their plan. We have prophesied all along that the Vestry would, in the end, be compelled to resort to the Thames, or return to the Water Company. They have chosen the worse alternative, and are about to engage the rates in heavy expenses for a supply of water of a most unsatisfactory character.

The Norwich Town Council have leased their sewage farm for £1710 a year, which leaves them with a deficit on the rental they pay of £823 per annum. The sewage is to be carried to the farm gratis. It must not be supposed that we rejoice over the misfortunes of the Corporation, who have lost, we believe, about £4000 a year on the farm; still, it is open to remark, that a more ill-considered scheme, to say the least, was never adopted by a Corporation. The art of farming with sewage-irrigated land may be said to be still in its infancy. That it may be very profitably followed we believe to be certain in the end. We hope that Norwich has obtained an intelligent, as well as an enterprising, tenant. His experience in the next five years, honestly told, will be valuable.

Sevenoaks is unquestionably a town which presents difficulties in the way of the disposal of the drainage. The Local Board have hit upon the expedient of adopting "absorbing "wells," and the adoption of these, as constituting a modified form of intermittent filtration, we are disposed to commend. They do not, however, suit the views of sensational engineers, who are satisfied with nothing but extensive and expensive works. Nor are they satisfactory to those who hope to reap profit from a sewage farm, to establish which the Local Board of Sevenoaks ask for a loan of £37,000. It is clear, however, from an inquiry before Major Tulloch, that the Local Board do not know what they want, and for the present—happily for the ratepayers—they do not get permission to borrow the sum named above. Let them go on with absorbing wells, which, if at all efficient, will fully answer their purpose, and involve but little expense.

AUCTION CLAUSES IN GAS BILLS.

During the last 21 years—*i.e.*, from 1856 to 1876 inclusive—360 Acts of Parliament affecting Gas Companies were passed. This number is exclusive of Acts by which the transfers of gas undertakings to Local Authorities were effected. Of these 360 Acts, 45 contain clauses which provide in various ways for the sale of new issues of shares by auction or tender. The following list embraces the whole:—

Gainsborough Gas Act (1856).—By clause 13 it is provided that one-half of the new shares shall be first offered to existing shareholders *pro ratâ*, the other half, together with the unaccepted portion of the first half, shall be sold by auction, or otherwise, as the directors deem most advisable. Premiums and bonuses or discounts and losses on such sales shall be "added to or abstracted from the capital of the Company, as the case may be." No calls to be made on shares at intervals of less than two months.

Sunderland Gas Act, 1857.—By clause 21, new shares are directed to be sold by auction. No reserve price is fixed. Premiums on sales not to be considered as capital entitled to dividend.

Glasgow Gaslight Act, 1857.—Clause 1 provides that the Company may create and sell by public or private sale, at such prices as can be obtained for the same, 2600 shares of £25 each. Before offering to sell privately, shares to be offered to public auction. If not sold by auction, the company may for three months afterwards sell privately, but not at a less price. Premiums obtained by sale not to be divided among shareholders.

Glasgow City and Suburban Gas Act, 1857.—All new shares are, by clause 24, to be sold by public roup, either at Glasgow or Edinburgh. All moneys thus received, after deducting expenses of sale, to be applied to extensions and improvements of works, &c.

Shrewsbury Gas Act, 1857.—By clause 23 it is provided that the Company *may*, by resolution of general meeting, determine to sell new shares by public auction, on conditions to be determined by the Directors, the premiums on sales not to be entitled to dividend. If no such resolution be passed, or if no sale by auction be effected, new shares to be offered to existing shareholders.

Stockton Gas Act, 1857.—Clause 28 enacts that shareholders, in general meeting, *may* determine to sell new shares by auction. Directors to determine the conditions; premiums on shares not entitled to dividend. If no resolution of general meeting be passed, and the old shares are at a premium, the new shares shall be allotted among existing holders.

Nottingham Gas Amendment Act, 1858.—By clause 6 the committee of the Company are required to cause additional shares to be sold by public auction—premiums not entitled to dividend.

Maidstone Gas Act, 1858.—By clause 21, the Company, at a general meeting, *may* determine to sell new shares by auction, the Directors fixing the conditions and the reserve price—premiums to be applied to capital purposes, but not entitled to dividend. If no such resolution, shares to be allotted *pro ratâ* among existing holders.

Scarborough Gas Act, 1859.—Under clause 3 the Company, at an extraordinary meeting, *may* direct the whole of the new shares to be sold by auction, on conditions to be fixed by the Directors. Premiums on sales not to be considered profits, but to be expended on capital account, without being entitled to dividend. If no resolution to sell by auction be adopted, and the old shares are at *par*, or at a premium, the new shares to be distributed *pro ratâ* amongst existing holders.

Dover Gas Act, 1860.—New shares (clause 22) to be offered for sale by public auction. Directors to fix reserve price and conditions of sale. Premiums not entitled to dividend. Shares to be called up at intervals.

Huddersfield Gas Act, 1861.—Shares created by this Act, in lieu of existing shares in old Company, to be first offered to proprietors, and by clause 22 it is enacted that shares unappropriated shall be offered for sale by auction at not less than par value. If not so sold, to be disposed of as the Company think fit. (*Company since transferred to Corporation.*)

Swansea Gas Act, 1861.—Reincorporation of Company. Capital divided into 4000 shares of £25 each, 240 of which shares to be allotted to existing shareholders, in lieu of holdings in original capital, with maximum dividend of 10 per cent. Of the remainder of such shares, 480, called "new shares," to be allotted to existing shareholders as paid-up shares, with a maximum dividend of 7½ per cent., the balance—viz., 3280 shares—to be offered for sale by public auction (clause 23) under such conditions as the Company think fit. If a preferential dividend be attached to them, it is not to exceed 5 per cent. Reserve price to be fixed by Directors. No dividend on premiums.

Sowerby Bridge Gas Act, 1861.—By clause 24 it is provided that, upon the creation of any new shares under the powers of this Act, it shall be lawful for the Company to set aside any portion of such shares, not exceeding one-half of the same, to be appropriated to large consumers of gas supplied by the Company, who are not then holders of shares in the Company, *or* to be sold by public auction, or otherwise disposed of for the benefit of the Company in such manner as a general meeting may determine. Premiums not entitled to dividend. (*Company since transferred to Local Board.*)

Portsea Island Gas Act, 1861.—By Clauses 6 and 7, half of the new shares to be allotted amongst the old proprietors, the other half to sold by auction in the borough of Portsmouth. Unsold shares to be offered to existing shareholders at par. Premiums on sales not entitled to dividend.

Leeds New Gas Company's Act, 1862.—Clause 8 enacts that shareholders may direct the whole or any portion of new shares to be sold by auction. Shares not so sold to be distributed among existing holders, upon such terms as a meeting of the Company may direct. Premiums not entitled to dividend. (*Company since transferred to Corporation.*)

Reading Gas Act, 1862 (Clause 52).—New shares to be offered by auction within the borough of Reading, on such conditions as the Company may determine. Shares unsold in that manner to be offered to existing proprietors at par. Premiums not entitled to dividend.

Leeds Gaslight Company's Act, 1863. By clause 11 the meeting at which new shares are created *may* direct the whole or any number to be sold by auction, at not less than their nominal value. Unsold shares to be distributed at *par* amongst existing holders. No dividend to be paid on premiums received. (*Company since transferred to Corporation*).

Harrogate Gas Act, 1863.—New shares to be sold by auction at Harrogate (clause 22). Premiums not entitled to dividend; 20 per cent. to be the largest amount of call at any time.

Yarmouth Gas Act, 1863.—Clause 24 provides that new shares shall be sold by auction. The largest call to be 25 per cent., and no two calls within a period of three months. Premium on sales not entitled to dividend.

Hertford Gas Act, 1864.—Clause 23 directs new shares to be sold by auction, with one-fifth of their value paid up. Premiums not entitled to dividend.

Salisbury Gas Act, 1864.—Clause 27 directs that new shares shall be sold by auction at such times and under such conditions as the company determine. Premiums to be expended on works, and not entitled to dividend.

Tunbridge Wells Gas Act, 1864.—By clause 27 it is made lawful for a general meeting of the Company to direct that the whole, or any portion, of new capital *may* be sold by auction; if no resolution to that effect be passed, the new shares may be distributed as a general meeting direct. If a sale be made, and premiums realized, no dividend payable in respect of same.

Chesterfield Gas and Water Act, 1865.—Clause 6 provides that new shares shall, in the first instance, be offered to sale in lots, of not more than five shares, by public auction in the town of Chesterfield, after 14 days notice—premiums, if any, on sales to go to the Company's reserve-fund, and not be entitled to dividend.

Exeter Gas Act, 1865.—By clause 30 it is enacted that on every issue of new shares, one-half of the number issued shall be sold by auction in lots of not more than two; the other half may be distributed as the Company in general meeting shall direct. Premiums realized on sales to go to the reserve-fund, and no dividends to be paid in respect thereof.

Fareham Gas Act, 1865.—New shares to be offered for sale by auction in the town, the reserved price put upon them not to exceed the nominal value of the shares, and any money received by way of premium to be considered as profits of the Company. (Clause 23.)

Gomersal Gas Act, 1865.—New shares with 20 per cent. of nominal value paid up, and calls to be made at intervals of not less than three months, *may*, by clause 47, be sold by public auction, if a general meeting of the Company so determine, upon such conditions, &c., as the directors think fit; unsold shares to be distributed as a further general meeting direct. Premiums from any sales not entitled to dividend.

Hastings and St. Leonards Gas Act, 1865.—General meeting may determine whether all or any of the new shares shall be sold by auction or tender. Shares not sold, or not directed to be sold, to be distributed as meeting may decide. No dividend to be paid on premiums (clause 7).

Littleborough Gas Act, 1865.—Unsubscribed shares in original capital, and one-third of the number of new shares, when created, shall be offered for sale by auction within the village of Littleborough, in lots of not more than five shares each, and not under nominal value. Remaining two-thirds of new shares to be allotted *pro ratâ* amongst existing shareholders (clause 16). Premiums not entitled to dividend.

Aldrington and Brighton Gas Act, 1866.—(This Company never commenced operations.) One-half of the original capital, by clause 10, is directed to be raised by the sale and distribution of shares by auction, in lots of not more than two each, at par value, such shares, if not so disposed of, to be allotted as the Directors think fit, at their nominal value. Premiums on sales to be carried to reserve-fund.

Brighton and Hove General Gas Act, 1866.—One-half of new shares to be sold by auction, in lots of not more than two each, and not under par (clause 11). Unsold shares to be allotted, in the discretion of the Directors, at not less than nominal value. Premiums not entitled to dividend, but to be carried to reserve-fund.

Canterbury Gas and Water Act, 1866.—Clause 24 provides for the issue of new A and B shares, and clause 29 enacts that, before any A shares are distributed among existing shareholders, they shall be on offer for 30 days among the shareholders of the Canterbury Gas Consumers Company. In default of being thus taken up, the Company, in general meeting, *may* direct that the whole or any number of the A shares, and the whole or any number of B shares, shall be sold by auction, under such conditions as the Directors may fix. If not so sold, to be distributed at discretion of Company. Premiums not entitled to dividend.

Eton Gas Act, 1867.—The general meeting of Company, at which any new shares are created, *may* direct the sale of the whole or any part by auction (clause 26). Meeting may also determine what shall be done with unsold portion. Premiums not entitled to dividend.

Hampton Court Gas Act, 1867, contains similar provisions to those last-mentioned (clauses 31 and 32).

Scarborough Gas Act, 1867.—General meeting of Company *may* resolve to sell the whole or part of new shares by auction or tender (clause 9). Unsold portions to be allotted in the discretion of the shareholders meeting. Premiums not entitled to dividend.

Sutton, Southcoates, and Drypool Gas Act, 1867, contains similar provisions to those last named (clauses 29 and 30).

Hebden Bridge Gas Act, 1870.—By clause 33 the Directors of the Company are empowered, if they think fit, to sell the whole or any portion of new shares by public auction; shares not so sold to be distributed as a general meeting of the Company may direct, and any premiums to be considered as capital of the Company.

Reading Gas Act, 1870.—By clause 7 it is provided that before any new shares are offered to existing holders, whether original shares are at a premium or not, they shall be put up for sale by auction in the borough, with a reserve of not less than nominal value. Shares not so sold to be offered to existing proprietors at par. Premiums on sales not entitled to dividend.

St. Helen's Gas Act, 1870.—The directors, by clause 11, are required to put up new shares to auction; conditions of sale in their discretion. Premiums not entitled to dividend.

Shipley Gas Act, 1870.—Clauses 11 and 12 contain similar provisions to those last mentioned.

Boston Gas Act, 1871.—New shares are, by clause 6, to be first offered for sale by auction, whether ordinary shares at premium or not, the reserve price at sale not to be less than, nor to exceed, the nominal value of the shares. Premiums realized not to go to increase any dividend, nor be considered as capital entitled to dividend. Shares remaining unsold to be offered at par to old shareholders.

Thirsk Gas Act, 1871.—Clause 27 provides that whether old shares are at a premium or not, the new shares shall be first offered in lots of five each to public auction, the reserve price being not less nor more than their normal value. Shares unsold to be offered to existing holders in manner prescribed by the Companies Clauses Act, 1863. Premiums to be applied to the purposes of the Company, but not entitled to dividend.

Todmorden Gas Act, 1871.—The whole or any number of new shares *may* be sold by auction, subject to such conditions as the directors may think fit. Unsold shares to be distributed in such a manner, and upon such terms, as a general meeting may direct, and premiums from sales to be considered capital of the Company (clause 35). Highest amount of call 20 per cent.

Whitby Gas Act, 1871.—Clause 28 enacts that new shares shall be offered by auction in lots of not more than five, whether original capital at a premium or not. Reserve price not to be less, nor to exceed, nominal value. Unsold shares to go to existing holders, in manner provided by the Companies Clauses Act, 1863. No dividend to be paid on premiums.

Gloucester Gas Act, 1872.—By clause 9 it is directed that all new shares and stock shall be offered to the holders of existing shares, whether the original capital is at a premium or not, according to the provisions, respecting proportionate allotment, contained in the Companies Act, 1863; if not taken up by any allottee within 21 days after offer, such shares are to be offered to other holders, as the Directors think fit, and so on, *toties quoties*, until the whole of the new shares or stock shall have been accepted or declined; and, if any new shares remain unappropriated at the end of six months, they shall be sold by auction, or otherwise, in the city of Gloucester, in lots of not more than five each, and not under par. Premium to be applied as capital, and not entitled to dividend.

Bristol United Gas Act, 1873.—Clause 8 gives power to create new capital, and directs that it shall, in the first instance, be offered for sale by public auction. Premiums applicable to capital purposes, but not entitled to dividend.

Lincoln Gas Act, 1873.—By clause 8 it is provided that new shares shall, in the first instance, be offered to the then holders of the Company's ordinary shares, as created or reconstituted by this Act. If not taken up by them within 21 days, the shares are to "be offered for sale by public auction, or otherwise, within the city of Lincoln, in lots of not more than five shares each, in such manner, at such times, and subject to such terms and conditions of sale, not inconsistent with the provisions of this Act, as the Directors of the Company think fit, provided that at any such sale the reserve price shall not be more than the nominal value of the shares offered for sale." No dividend to be payable on premiums; no call to exceed one-fifth the amount of share.

Neath New Gas Company's Act, 1873.—Clause 12 enacts that the new shares shall be first offered to the public by auction, in the borough of Neath, whether the old stock be at a premium or not. The Company are at liberty to determine the conditions of sale, the only restriction upon them being that the reserve price shall not be less than the nominal amount of the shares. Premiums on sales, after deducting expenses, are to be employed as capital, without dividend. Unsold shares are to be offered to old proprietors at par.

Newcastle-upon-Tyne and Gateshead Gas Act, 1873.—Clause 10 provides that "the Directors *may*, by order of a general meeting, from time to time create new stock, &c., and shall cause the new stock to be offered for sale by public auction," on such conditions as they may determine. Premiums on sales not to be considered as capital entitled to dividend. One-fifth of the amount of shares to be paid on allotment, and no after call to exceed that rate.

Nottingham Gas Act, 1873.—New shares of the nominal value of £50 each, with one-fifth paid up, to be sold by auction, on conditions to be determined by the Company—future calls to be at the option of the Directors; no dividends to be paid on premiums.

Scarborough Gas Act, 1873.—Clause 10 makes it lawful for the meeting, at which new shares are created, to direct that the whole, or any part thereof, may be sold by auction or tender. Unsold shares to be disposed of as a general meeting of the Company may direct. No dividends to be paid on amounts received by way of premiums.

Colchester Gas Act, 1875.—Before new shares are offered to existing holders, they are, by clause 7, required to be offered for sale by auction, within the borough, on conditions to be fixed by the Company, but not at less than par. Unsold shares to be subsequently offered at par to old shareholders. Amount paid up to be one-fifth of the nominal value, and no future calls to exceed that rate. No dividends payable on amount received as premiums.

Southampton Gas Act, 1876.—Clause 16 provides that new shares shall, in the first instance, be offered by auction, within the town, on conditions to be fixed by the Directors. One-fifth the amount paid up at once, and calls at intervals of not less than two months, and of not more than one-fourth the amount of share to be made in future. Premiums not entitled to dividend. No provision is made for disposing of unsold shares.

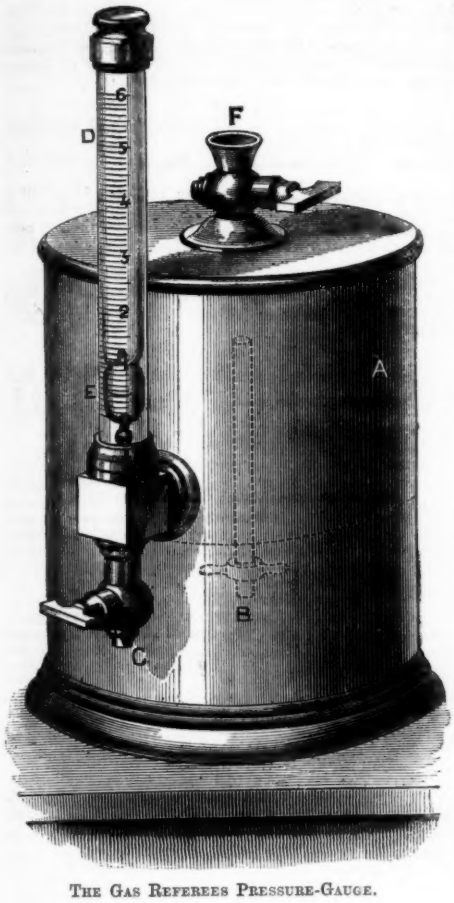
South Metropolitan Gas Act, 1876.—By clause 13, new shares are to be sold by auction or tender, in first instance, whether old shares at premium or not. The Company are to fix the conditions of sale, except that, with regard to reserve price, it is enacted that it shall not be less than the nominal amount of the share. Notice of the amount of reserve fixed to be sent in a sealed letter to the Board of Trade 24 hours before auction, or last day for receiving tenders; and of the intended sale, to the Metropolitan Board and Stock Exchange 28 days previously. Shares not sold by auction to be offered to ordinary shareholders at the reserve price. If not accepted within one month the shares are to be again submitted to auction. Premiums received to go to capital account without dividends. This Act provides a sliding scale of dividends on shares. Rateably with the additional share capital, the Company are required to raise an equal amount of money by the issue of debenture stock, or by borrowing on mortgage.

The Gaslight and Coke Company's Act, 1876, contains similar provisions to those last mentioned, and requires, in addition, that notice of sale of shares shall be given to the Corporation of the City of London.

Communicated Article.

THE GAS REFEREES PRESSURE-GAUGE.

The South Metropolitan and Chartered Gas Acts of last session direct that the Referees shall prescribe and certify the mode to be adopted for testing and recording the pressure of the gas supplied by the companies. The summer instructions of the Referees just issued provide that six observations of pressure shall be made daily, three of which shall take place in the interval from midnight to sunset, and three during the interval from sunset to midnight. The apparatus for this purpose is that now known as "The Referees Pressure-Gauge."



THE GAS REFEREES PRESSURE-GAUGE.

This pressure-gauge is constructed as follows:—A cylinder, A, of pure tin, 7 inches in diameter, closed at the top and bottom by plates of the same metal, forms one leg of a syphon pressure-gauge. A glass tube, D, half an inch internal diameter, flashed at the back with white glass, and graduated on the front in linear inches, is cemented into a metal screw connexion. It is then put in communication with the cylinder by means of an elbow fixed in the side of the latter, near the bottom. Into this the glass-tube is screwed, and forms the other leg of the gauge. A cock, F, is fixed into the top of the cylinder, for the purpose of permitting the entry of the atmospheric pressure when it is desired to examine the water-line. Another cock, C, is fixed into the bottom of the elbow, beneath the glass tube, for the purpose of letting out any superfluous water from the gauge. The zero line, instead of being in the middle of the glass tube, as is usual in syphon-gauges, is in this apparatus, placed near the bottom. The reason for this arrangement is that the column of water indicating the degree of pressure rises in the glass tube only. The descent of the column in the cylinder leg of the gauge is inappreciable, by reason of the great difference in its area in comparison with that of the glass tube. Communication with the gas is in this case made through the bottom of the cylinder, by means of a tube, B, rising above the surface of the water, or it may be made by a connexion fixed on the side of the cylinder near the top.

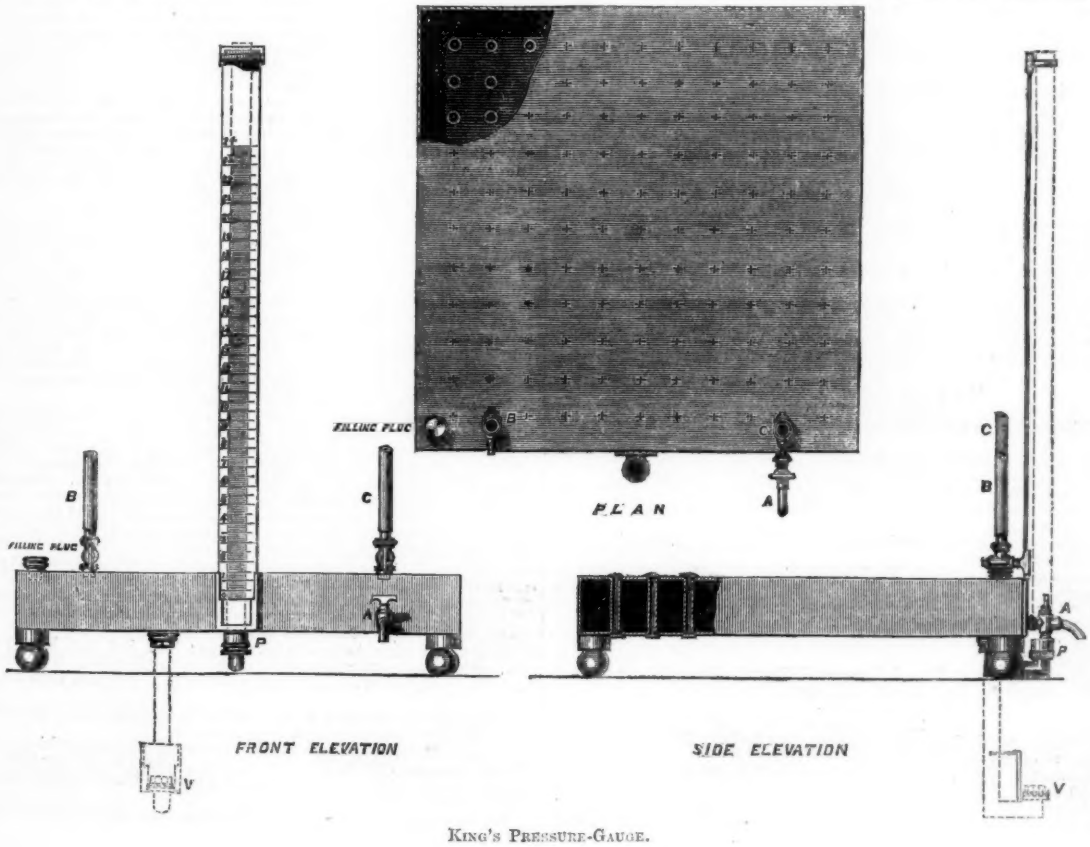
The action of this gauge is as follows:—Sufficient water having been first put into the cylinder through the cock at the top to bring the column of water in the tube up to the zero line, the cock is closed. Gas being admitted into the cylinder displaces the water, and drives it up into the glass tube, until the pressure of that column balances the pressure in the cylinder. The pressure in inches of water is then easily read off on the graduated tube. It is not necessary, even if it were possible, to verify the position of the column of water in both legs of the pressure-gauge, and those who have much to do with syphon-gauges will at once appreciate the advantage of having to deal with only one surface of water.

Such a gauge as this, but on a more exact scale, was designed more than thirty years ago by the late Mr. Alfred King, M. Inst. C.E., of Liverpool, for the purpose of testing the graduations of the gauges invented by him, and which are generally known now as "King's Gauges."

This instrument consists, as will at once be seen from the drawing, of a cistern of tinned copper, 2 feet square and 3 inches deep, stayed all over its surface with copper tubes, three-eighths of an inch in diameter and 2 inches apart, so as to secure great rigidity, and prevent any alteration of form under pressure. On the front of the cistern, a glass tube, three-quarters of an inch in diameter internally, is arranged in such a manner as to permit of the gauge being used either for vacuum or pressure.

The proportion of the cistern to the tube is so great that for all practical purposes the rise or fall of the water in the tube gives correct readings; but, if very great exactness is required, the necessary allowance can be made in graduating the scale. When the gauge is to be used, the cistern is filled with water to the level of zero on the scale, the water-level being adjusted by means of the tap, A. A connexion is then made by the half-inch lead pipe, B, to an accumulator or other source of pressure, and any desired amount is turned on. Another half-inch lead pipe, C, forms the connexion to the gauge or other instrument under examination.

The glass tube with its socket is screwed on at the point V or P, according as the



KING'S PRESSURE-GAUGE.

gauge is to be used for vacuum or pressure, the tube not in use being closed with a brass plug.

The Liverpool Gas Company make all the pressure-gauges—registering, dial, and syphon—used on their works, and it is with the gauge just described that they have always been verified.

For the same purpose, a similar gauge to that adopted by the Gas Referees has been made and used by Mr. W. Sugg, of Westminster, for more than five years past. But it would seem that neither Mr. Sugg nor Mr. King has ever published a description of his apparatus, or used it in any other way than that mentioned. As already stated, Mr. King's gauge is made to show either vacuum or pressure; and the dimension of the reservoir, corresponding to the cylinder of the Referees instrument, is so great, that the error in linear measurement on the graduated scale is less than 1-1000th of an inch. That used by Mr. Sugg is of lesser dimensions, and has, in consequence, a greater error, or nearly 1-100th of an inch.

The Referees gauge has been designed by Mr. A. Vernon Harcourt, who had no knowledge beforehand of the existence of the other two instruments invented by Mr. King and Mr. Sugg; and it has been constructed for him by Mr. F. W. Hartley, of Westminster. In order to facilitate the reading of the pressure, Mr. Harcourt has introduced a small glass float, E, which, being balanced by a drop of mercury, floats vertically in the liquid in the graduated glass tube. A line traced across the middle of the float is the point at which the pressure is read.

Correspondence.

THE GAS REFEREES SUMMER INSTRUCTIONS.

SIR,—The reasons for the prescription by the Gas Referees of three testings for pressure during the interval from midnight to sunset, except in the case of gas supplied by the Commercial Gas Company, are to be found in the recent Acts of the companies concerned.

According to the provisions of The Gaslight and Coke Company Act, 1876 (sections 27, 42, and 52), and the identical provisions of the South Metropolitan Gaslight and Coke Company's Act, 1876, the Gas Referees are to prescribe the mode to be adopted for testing the pressure of gas supplied by the company, and the number of the times of testing; "the average of all the testings of pressure prescribed under this Act from midnight to sunset, and the average of all the testings of pressure from sunset to midnight, shall be deemed to represent the pressures during each of these periods;" and "if on any day, whether during the period from midnight to sunset, or during the period from sunset to midnight, the gas supplied by the company from any station is supplied at a pressure less than it ought to be under this Act, the company shall forfeit a sum not exceeding ten pounds for each station, in respect of which they are so in default."

To carry out these provisions, it is clearly necessary that more than one testing of pressure shall be made at each testing-place daily during the period from midnight to sunset.

We are not called upon to prescribe at what times nor at what intervals these testings should be made. Probably a gas examiner, having to visit the testing-place between "midnight and sunset," would make then a testing of illuminating power and testings of pressure—each of which is, literally, the work of a minute—at the beginning, middle, and end of his visit.

The Commercial Gas Act, 1875, does not divide the day into two periods; and, therefore, in the case of this company, we have not prescribed testings of pressure during the period from midnight to sunset.

A. VERNON HARCOURT.

17, *Buckingham Street, Adelphi, W.C., April* 13, 1877.

Parliamentary Intelligence.

HOUSE OF LORDS.

FRIDAY, APRIL 13, 1877.

The Examiners reported that no further Standing Orders are applicable to the Edinburgh and District Water, the Falmouth Water, and the London Corporation Bills.

The Blackburn Borough Gas, Water, and Extension Bill was reported, with amendments.

The following Bills, brought from the Commons, were read the first time, and referred to the Examiners:—Dundee Gas; Maryport District and Harbour Gas; Middlesbrough Corporation; Rotherham Corporation; Warrington Corporation Gas; West Surrey Water.

HOUSE OF COMMONS.

MONDAY, APRIL 9, 1877.

The Warrington Corporation Gas Bill was read the third time, and passed.

On the motion of Sir CHARLES FORSTER, it was ordered that the minutes of the evidence taken before the committees on the London (City) Corporation Gas Bill, 1866, and the Metropolis Gas Bill, 1867, be referred to the committee on the Crystal Palace District Gas and The Gaslight and Coke Company Bills.

A petition for additional provision in the Colne Gas Bill was referred to the Examiners.

A petition was presented by Mr. Morgan Lloyd, from the Peterborough Gas Company, against the proposed Standing Order relative to auction clauses in Gas Bills.

A petition against The Gaslight and Coke Company Bill (the petitioners not praying to be heard) was presented from the Vestry of St. Luke, Middlesex.

The petition of Henry Gerard Hoare and Henry Seymour Hoare against the Bolton Improvement Bill was withdrawn.

TUESDAY, APRIL 10.

The Middlesbrough Corporation and the Rotherham Corporation Bills were read the third time, and passed.

The Lowestoft Water, Gas, and Market Bill (Lords) was read a second time, and committed.

Petitions in favour of the Bolton Improvement Bill were presented from (1) Inhabitants, owners, and occupiers in Over Stulton; (2) Inhabitants, owners, and occupiers in Ainsworth.

The petitions of (1) Sir Charles Henry Tempest, Bart.; (2) John Knowles and others, against the Bolton Improvement Bill, were withdrawn.

The Leicester Gas, Ashton-under-Lyne Gas, Ashton-under-Lyne Improvement, Dukinfield and Denton Local Boards of Health, Hanley Corporation Gas, Carnforth District Water, Newcastle-under-Lyme Borough Extension and Improvement, and Heywood Water Bills were referred to a Select Committee, consisting of Mr. Sandford (chairman), Mr. Lambert, Mr. Hanbury, Sir Hugh Cholmeley, and Mr. A. Bonham-Carter (referee); to meet on Thursday, April 19.

WEDNESDAY, APRIL 11.

Petitions were presented in favour of the Ashton-under-Lyne Gas Bill, from the Local Board of Mossley; in favour of the Hanley Corporation Gas Bill, from Inhabitants and consumers of Gas in Hanley; and against the Bolton Improvement Bill (the petitioners not praying to be heard), from Owners, &c., and ratepayers of Tong-with-Haulgh.

THURSDAY, APRIL 12.

A petition for additional provision in the Newcastle and Gateshead Water Bill was referred to the Examiners.

The Maryport District and Harbour Gas Bill was read the third time, and passed.

On the motion of Mr. WHALLEY, leave was given to bring in a Bill to give further facilities to landowners of limited estates in England and Wales to charge such estates with the expense of constructing reservoirs for the storeage of water. The Bill was afterwards presented, and read the first time.

The petitions were withdrawn of the Dublin, Wicklow, and Wexford Railway Company against the Alliance and Dublin Consumers Gas (Bray Supply) Bill; and of the Stalybridge Gas Company against the Ashton-under-Lyne Improvement Bill.

FRIDAY, APRIL 13.

The Examiners report, "That the Standing Orders have not been complied with in the case of the petition for additional provision in the Colne Gas Bill," was referred to the Select Committee on Standing Orders.

The Stamford Water and Kent Water Bills were reported,

AUCTION CLAUSES IN GAS BILLS.

Mr. BRISTOWE gave notice to move as an amendment to the proposed Standing Order, to add, at end, "In the case of every such Bill it shall be competent to the committee so to regulate the price of the gas to be charged to consumers that any reduction of an authorized standard price shall entitle the company to make a proportionate increase of the authorized dividend, and that any increase above the standard price shall involve a proportionate decrease of dividend."

SATURDAY, APRIL 14.

The petitions were withdrawn of the Corporation of Lancaster against the Carnforth District Water Bill; and of the Corporationof Ashton-under-Lyne against the Dukinfield and Denton Local Boards of Health Bill.

HOUSE OF COMMONS COMMITTEES.

THURSDAY, MARCH 15.

(*Before Mr.* HIBBERT, *Chairman; Mr.* BALFOUR, *Sir* GEORGE CAMPBELL, *and Lord* MUNCASTER.)

LONGTON CORPORATION BILL.

Mr. CRIPPS, Q.C., and Mr. MICHAEL appeared for the promoters. Sir EDMUND BECKETT, Q.C., Mr. LITTLER, Q.C., and Mr. STEPHENS appeared for the Duke of Sutherland; and Mr. YOUNG for inhabitants of Blurton and other places, petitioners against the Bill.

Mr. CRIPPS, in opening the case for the promoters, said that the object of the Bill was to transfer all the rights and interests of the Longton Gas Company to the Corporation. The advisability of effecting transfers of this description was a matter of principle, but it had been adopted by Manchester and other large towns, and, he believed, had produced beneficial results. In some instances, the gas company might be reluctant to sell; but in this case that difficulty had been got rid of, all the terms having been settled between the corporation and the company out of Court. In 1866 another company was absorbed by the present company, and in 1875 the latter came to Parliament for the purpose of acquiring power to raise additional capital. The Bill was opposed by the corporation, but an arrangement was afterwards made by which the corporation were to buy the whole of the works, and henceforth to supply the town and district on the same terms and conditions as the company had done, and the object of this Bill was to obtain the sanction of Parliament to the arrangement.

The following witnesses were then called:—

Mr. *George H. Hawley*, examined by Mr. CRIPPS.

I am town-clerk of the borough of Longton. The gas company there were incorporated by the Longton Gas Act of 1866, and were authorized to supply the town and other places adjoining. Their capital was fixed at £40,000, with borrowing power up to £10,000. Under a second Act obtained by them in 1875, their limits of supply were extended. An agreement has now been come to between the corporation and the company for a transfer of the undertaking. It is also desired to purchase further lands on which to manufacture gas. There is no objection on the part of any one to the purchase of these lands for that purpose. From 1866 down to the present time I have been solicitor to the company, so that all matters about their capital are within my knowledge.

Cross-examined by Sir EDMUND BECKETT: Taking the existing capital of the company at £40,000—viz., £20,000 at 10 per cent., and £20,000 at 7 per cent.—the possible dividend is £3400 a year. We have arranged to give the company £73,150. That at 5 per cent. will amount to £3655. There is no limitation by the Bill as to what we can earn. That being so, we could divide, at the moderate amount of 5 per cent. interest, some £300 a year beyond what the company can. The rates at which the corporation borrow money vary. The money for sewerage purposes was borrowed from the Public Works Loan Commissioners at 4 per cent.; but they will not give us a loan for the gas-works; or, at least, if they give it at all, most certainly it would not be for a longer period than 20 years, or at a less rate of interest than 5 per cent. What there is of the Florence district has risen up quite lately. It is very small—a population of 200 or 300 would be an outside figure, I should think.

Sir E. BECKETT: As to the 7s. 6d. per 1000 feet you have power to charge for gas beyond one mile, how do you justify that? If you step over a single yard, you are to charge double the price; is not that something extraordinary?

Witness: It is justified, in my opinion, in this way—that, as a matter of fact, the extension of mains results in a loss.

Cross-examination resumed: The district of Florence, which, I believe, is all within the mile radius, can only be charged 3s. 6d. per 1000. There was a talk some time ago of creating a separate district with a local board for Florence, but it came to nothing.

By the COMMITTEE: Florence is within the district of the Sanitary Authority of Stone.

Sir E. BECKETT: If a local board were formed for Florence, would you have any objection to their supplying their own gas?

Witness: That is hardly a matter I can answer. Speaking from the corporation and the gas company's point of view, I should say decidedly there would be.

Cross-examination continued: At the first negotiations between the company and the corporation, it was thought a sale and transfer could be effected under the 162nd clause of the Public Health Act of 1875. We applied to the Local Government Board for their sanction; but after mature consideration they decided that we could not buy anything outside our district. I believe the 162nd clause was intended to enable corporations and local boards to buy gas-works both inside and outside their districts. The Local Government Board, however, differed from me, hence we are here with this Bill.

By Mr. YOUNG: The corporation contemplate deriving a profit from the gas-works, but I do not know of what amount. In the Bill the maximum price to be charged in the borough, and within the one-mile radius, is 3s. 6d. per 1000 feet, but it will not disable us from charging one rate within the municipal borough, and another rate within the mile radius. With reference to the population of the outside places, such as Blurton, Blyth Bridge, &c., I believe 10,000 would cover all. The Longton population, according to the last census, was 20,000. I believe Longton will extend towards Blyth Bridge, but I do not anticipate it will be very rapid. In the direction of Blyth Bridge I believe there is upwards of a mile of main which has no connexion on it. I do not know of my own knowledge, but have heard it in the course of examination of witnesses, and so on, that there is a loss in supplying Blyth Bridge with gas. The Gas Committee of the corporation unanimously recommended that the maximum price of gas should be 5s. per 1000 feet outside the mile radius, with a reduction when the price charged in the borough was below 3s. 6d., and by a majority of one, I think, the committee of the whole council agreed to the same terms. Then it is fair that I should say those resolutions were afterwards rescinded by the council by a majority of 13 to 9, and it was stated by some of the members who voted for the original resolution that they had not sufficient evidence before them at the time to justify them in coming to this conclusion. The company are now charging 3s. 6d. within the borough, and 6s. uniformly outside the mile radius, except in the case of the railway company, who are charged 5s. 6d. at Blyth Bridge.

By the COMMITTEE: From the mile radius the mains extend about 2½ miles in a line along the Blyth Bridge Road—that is, to the extent of the company's limits of supply, although they may branch from side to side.

Re-examined by Mr. CRIPPS: The provision for a different charge in and outside the borough is not now introduced, but was the result of the legislation of 1875, when this particular district of Blyth Bridge was taken into the limits of supply. Since that time mains have been laid down, and expenses gone to in supplying them on the basis of the Act of 1875. I do not know that Florence has any defined boundary, and am not aware any portion of it is outside the mile radius. I never heard of any proposal for a new gas company to supply that district, except what is in the Duke's petition. The necessity for our coming to Parliament arises from the fact that we take over the right of supply to some parts out of our borough. What has been done in almost every case, where a gas company have been transferred to the municipal authority, is that the outlying parts which the company were supplying go with the bulk to the corporation. Otherwise, a considerable portion might be left in total darkness.

Mr. *Robert H. Hawley*, examined by Mr. CRIPPS.

I am an alderman and Justice of the Peace for Longton, and chairman of the Parliamentary Committee of the Council. Longton has an area of 960 acres, and a population of 20,000, principally employed as potters and colliers. Many of our tradesmen and manufacturers, though their places of business are in Longton, reside some distance from the town, and, consequently, are not subject to its rates. There is no opposition to this Bill from the two local boards whose districts are within the mile radius. On the contrary, they have petitioned in favour of it. There is, however, dissatisfaction expressed on behalf of Florence, and a petition presented. There are 155 consumers of gas in Florence, and their total rental is £323 18s. a year, or an average of £2 1s. 3d. for each consumer. Normacott adjoins Florence, and has 58 consumers, whose average rental is £1 17s. 6d. Outside the mile radius at Blyth Bridge there are 45 consumers on four miles of mains. The gross receipts upon that main are £214 0s. 10d. The whole capabilities of the company, and their rights, were certainly considered when the contract to purchase was entered into. This was before the company obtained their last Act; but at the time the cost of carrying this main to Blyth Bridge was one of the matters under consideration in our negotiations with the company. The Blyth Bridge extension cost £3234 5s. 10d. Last year the rental was £214 0s. 10d. We estimated the cost of making the gas to be £81 4s. 9d., being 2s. 3d. per 1000 for 722,300 feet. This leaves a profit of £132 16s. 1d. Seven per cent. on the outlay of £3234 is £226 7s., thus showing a loss of £93 10s. 11d. I am a coal-master, having collieries within the borough. In 1875 we charged 12s. 1d. per ton for coal. Before that there had been a considerable rise in price, but it has been gradually falling since. There is the difference between the 12s. 1d. then and 10s. 6d. now.

Cross-examined by Sir E. BECKETT: The price of coal has been as much as 16s. 8d. per ton. The corporation will not be able to charge more than 3s. 6d. within the mile radius; but if the circumstances justify them, they can charge as much below that price within the borough as they like.

Mr. YOUNG: Notwithstanding East Vale and Dresden are paying 3s. 6d. at the present time—the price at which the inhabitants of Longton are being supplied—by this Bill you will be entitled to charge them a different price from the inhabitants of the borough itself, if you think fit to do so?

Witness: You are wrong there. Whatever applies to the borough will apply to the one-mile radius. We do not seek to alter anything.

By Mr. YOUNG: The lighting of Blyth Bridge commenced, I believe, in November, 1875. I do not think all the houses that might possibly burn gas are attached at present; but, practically, they are. The total cost of the main to Blyth Bridge—£3234 5s. 10d.—includes, I believe, the cost of the parliamentary expenses (£600) and the main from the mile radius; but I am not aware it includes any portion of the expenses incurred between the mile radius and the gas-works. I should think the first year's rental on this main—£214 0s. 10d.—is not very good, and it is not susceptible of much further development.

Mr. YOUNG: Supposing, for instance, that the present main is larger than would be necessary for 12 or 14 years to come, that it has cost 40 per cent. more than it should, and that you ought to put on to the Blyth Bridge main only about a fourth of the parliamentary expenses, would not that reduce the outlay to about £1700?

Witness: In the first place I am not prepared to say that a less main would be practicable to go to Blyth Bridge, because I know that the additional pressure it requires to force gas through a small main for five miles entails a very serious loss upon a company in the way of leakage. I think to take the gas that four miles the main is not too large.

By Mr. YOUNG: When the company's 1875 Bill was deposited, the prices of coal and slack were coming down. I believe the contract the company had for coal from 1874 to 1875 was 12s. 6d. per ton, and I believe at the present time it is 10s. 4d.

By the COMMITTEE: Since the extension to Blyth Bridge was made, a little more than twelve months, the price of gas has been always at 6s. per 1000. I am not aware the company have ever charged their full maximum price of 7s. 6d.

Mr. *John H. Goddard*, examined by Mr. CRIPPS.

I am a Justice of the Peace for the county of Stafford and the borough of Longton, and was an alderman of the borough at the time the negotiations were going on for the purchase of the gas company. I am of opinion it would be a benefit to the town for the purchase of the gas-works to be carried out as proposed. There has been, in times past, a great deal of difficulty between the corporation and the company, and it was to put an end to the differences that it was thought expedient the gas-works should be purchased. When the corporation saw the company were about applying for further powers, it was a matter of calculation with them what steps they should take, and I strongly advised them to purchase, as I was of opinion it could not possibly pay to carry the gas to Blyth Bridge, on account of the sparse population. I stated that to the company, but they assured us they had made such calculations that there would be no loss if the scheme were carried out, and we accepted their statement. I recommended the council to purchase, even if they had to face a loss, and unfortunately my anticipations have been realized. It has ended in a dead loss to the company; and the ratepayers of Longton, if the purchase is completed, will have to bear that loss.

Cross-examined by Sir E. BECKETT: I do not think there is a probability of the number of consumers on the Blyth Bridge main doubling for a long time to come. I believe there is not at present any loss in supplying within the mile radius. When investigating the company's affairs, we did not inquire whether the thinner parts of the district were a loss, we took it as a whole.

Sir E. BECKETT: Then how do you make it out that, taking it as a whole, there being a loss upon the Blyth Bridge portion, it is to be such a very good thing for the corporation, because you give a high price for the undertaking?

Witness: At the time of the negotiations the 1875 Act had not been obtained, therefore the Blyth Bridge supply was not existing.

Sir E. BECKETT: I want you to explain why you think it a good thing for the town.

Witness: I hold very strongly that all corporate bodies should be the owners of gas and water works.

Sir E. BECKETT: That is a political proposition, but mine is a much humbler one, mine is merely pecuniary. How is it to be a good thing for the town in a pecuniary way?

Witness: I consider it would be so, as I do not know a single instance where a gas company have ever reduced their rates—that is to say, to give a benefit to the inhabitants of any excess of income that they have derived.

Sir E. BECKETT: Let me see if I can enlighten you. Did you never hear of a gas company being obliged to sell their shares by auction?

Witness: It has never come to my knowledge.

Sir E. BECKETT: Supposing this company were compelled to do that, it would be a better thing for the corporation than buying the works, would it not?

Witness: I think not.

Sir E. BECKETT: I want you to make that out.

Witness: At the time I was connected with the Gas Committee the corporation consumed about an eighth of the whole production of the company, the other seven-eighths being used by the middle classes. The working classes were contributors to the one-eighth, and I had tried repeatedly to get a reduction in the price charged for the public lamps, and had always failed; so seeing there was no probability of our succeeding, I recommended the town to purchase the works from the company at their own price.

Sir E. BECKETT: Do you not know that Parliament never allows the public lamps to be supplied at a lower price than the largest private consumer?

Mr. MICHAEL: That is not so, because the Gas-Works Clauses Act of 1871 expressly provides that the price for the public lamps shall be settled by arbitration; therefore it may be any price.

Sir E. BECKETT: Can you tell me any instance of late where, in a Gas Company's Act, a lower price has been allowed for the public lamps than for the largest private consumers?

Mr. MICHAEL: Yes, several. I should say the general principle has been that 6d. is taken off.

Sir E. BECKETT: Not against the largest private consumer.

Mr. MICHAEL: Yes.

Sir E. BECKETT: I differ from you. (To witness:) Just go on with that calculation, and tell me how you make out the undertaking is to be a profit to the corporation, even with this one-eighth complication, which I confess I do not follow.

Witness: Seeing that no division of profits, or rather that no benefit from overplus profits, had ever arisen to the ratepayers, I thought, and still think, that if the gas could be made at a profit we could reduce the price of the public lamps.

Sir E. BECKETT: Let me take you back to this calculation which I asked the town-clerk about, and he admitted, that supposing you borrow this money at 5 per cent., which he seemed to think was the lowest you could borrow at, you would be paying £3755 a year on your purchase. The gas company can now only divide £3400 a year. That looks to me like a loss of £355 a year to you.

Witness: That is assuming Longton is not going to increase; but if the consumers increase, and the quantity of gas produced increases, of course we shall get, I hope, the same ratio of profit upon the increased consumption as we do now.

Sir E. BECKETT: Supposing Longton does increase, you will have to lay new mains and enlarge your works, will you not?

Witness: I believe the works are in a state to produce a very much larger quantity of gas than is now required.

Mr. YOUNG: Is it not the fact that a year or so ago the corporation could have purchased the gas undertaking at a very much lower figure than at present?

Witness: Unfortunately for the corporation, in consequence of not being able to carry out a contract which was made in 1876, they have had to pay a higher figure by about £5000.

Mr. *William Webberley*, examined by Mr. MICHAEL.

I am a Justice of the Peace for the borough of Longton, and have been chairman of the gas company since 1868. The terms were arranged between us and the corporation for the purchase of the gas-works. As chairman of the company, I considered it desirable, in the interests of the town, that the corporation should purchase the undertaking. I believe it will be a source of profit, and assist them to reduce the taxes. It is my opinion that the profits should go in diminution of the rates. When we applied for our Act of 1875, owing to some informality in the notice, it was necessary to get the consent of the owners and occupiers in Blyth Bridge and Forsbrook before we could insert them in the limits of the Bill. Every householder in those places signed the memorial, and, in

consequence of that, we laid down upwards of three miles of main, 8 inches in diameter throughout, from the mile radius. The cost of it was £3234 5s. 10d., and the receipts for last year, when gas was sold at 6s. per 1000, were £214 0s. 10d.

Mr. MICHAEL: What ought to have been the annual incoming from the consumption in order to pay the expense and also a dividend upon the capital expended?

Witness: I have not here the figures of what it ought to be, but the loss by supplying at 6s. has been upwards of £90.

Sir E. BECKETT: That does not agree with what was given before. If the whole of the consumers had paid 7s. 6d., that would still have left a loss to the company of £35 7s.

Examination resumed: At what we did charge, 6s., we lost £93, which, added to the £214, makes £307, and if we had charged the maximum price, we should still have lost £35 15s. We hope for some increase of consumption, but not to a great extent, as there are no factories whatever in the whole of the district, from the mile radius on to Blyth Bridge. Up to that place they are generally cottages, and then there are a few villa residences. Before we undertook the district, Mr. Glover's private works were supplying gas at a charge of 12s. 6d. per 1000.

By the COMMITTEE: The gas that was charged at 12s. 6d. was made at Mr. Glover's private residence, close to the village.

Examination concluded: The Town Council were opposed to the extension of our works to Blyth Bridge. They were afraid a loss would be entailed upon the company, which eventually would fall on them, and on that account a deputation was appointed to wait on us. I stated myself to the gentlemen who came, that they ought to depend on our judgment in not taking gas there, unless we thought we could make a profit from it. My idea was, there would be a sufficient supply within the area to justify the expenditure of the money in laying down the main; but the consumption has not come up to the estimate of the directors by a very considerable amount.

Sir E. BECKETT: You take 7 per cent. as the thing you are entitled to by Act of Parliament, but that leaves a very large profit beyond the usual 4 or 5 per cent. which corporations pay. Supposing you take, instead of the 7 per cent., 5, which is the figure Mr. Hawley took, what is 5 per cent. upon £3234?

Mr. MICHAEL: £161 14s., and if you add the cost of manufacture (£81) to that, there is still a considerable loss—that is, £242 against £214.

Sir E. BECKETT: I am inquiring whether this is a wise proceeding or not. I have got enough for my purpose. (To witness:) Have you any kind of analysis you can give of how this £3234 is made up?

Witness: The laying of an 8-inch main and pipes on to Blyth Bridge, beyond the station, £2255; parliamentary expenses, £692 13s. 4d.; and extensions elsewhere, £286.

Cross-examination resumed: The whole of the district within the mile radius is profitable at 3s. 6d. per 1000, but there is a loss by supplying beyond. The thin parts of the district within the mile radius are certainly not supplied at a loss, because under the Act we are not obliged to take the gas beyond a certain distance from the public lamps, except by special arrangement. The districts of Florence and Normacott are new, because the Duke of Sutherland's mines there are only being sunk at present. We never expect any large consumption from them. There are a few villa residences there now, but the people are leaving them on account of the mines, so that we can only expect cottages, which are never profitable to a gas company. If we were keeping on the works, I should have no objection at all to being relieved from supplying beyond the mile radius on the Florence road.

By Mr. YOUNG: The Longton Gas Company have been very successful, having paid maximum dividends since 1866. When we took the concern over from the Stoke Fenton and Longton Company in 1866, we paid £4500 for the works, and £7000 for the goodwill. We paid £1300 out of revenue for the goodwill, and the rest out of capital. By the acquisition of the works by the corporation it is anticipated there will be a considerable reduction of the rates through the increase of consumers. In the half year ending June, 1866, the profit of the company available for dividend was £627 3s. 5d.; in the corresponding period of 1876 it was £1075 16s. 4d. So that the natural increase of the concern must be a profit to the town. That increase must certainly be within the municipal borough; we never expect any great increase from without. The 8-inch main to Blyth Bridge was laid, not so much in anticipation of a development of the works, as for economy. A 5-inch main would have been quite sufficient for the service, but the pressure on it would have caused a greater leakage of gas.

By the COMMITTEE: We did not expect a much increased demand when we made the extension. It was stated particularly before the committee on the Bill, that it was almost entirely an agricultural district from the mile radius till we got to Blyth Bridge. The main was laid at the request of the inhabitants, and there is no doubt there was a little feeling on the part of the directors (I speak of myself) to accommodate certain gentlemen without injuring the company.

By Sir E. BECKETT: The least sum, previous to 1875 or 1876, at which there was any bargain between the company and the corporation for a purchase was £4000 less than the present price. That was in October, 1874. This agreement broke down because the Town Council could not get power without an Act of Parliament. At a directors meeting Mr. Aynsley, the present opponent of this Bill, moved that the increased price should be asked, and he also wished, but the directors would not agree to it, that 25 years purchase should be paid by the town; that would be upwards of £80,000.

Re-examined by Mr. MICHAEL: The progress of the company has been exceptionally rapid, on an average doubling the consumption in eight years. In ten years we have nearly trebled the profits derived from the consumption of gas within the mile radius. There is no reason why that should not continue. On the capital expended on extension of mains outside the radius we have calculated 7 per cent. interest, which we ought to realize, so as not to injure the consumers outside or favour those inside. Otherwise we should, in reality, be detracting from the profits of the consumers within the mile radius, to supply gas at a lower price than it ought to be supplied at in the out-district. I do not think it is possible for an extension of buildings outside to take place. The period must be very remote, I believe, before that district can be made to pay; but supposing the circumstances did exist, we ought, in the interests of the consumers outside, to keep up the price, so that no loss would be incurred.

Mr. *James M. Darwin*, examined by Mr. MICHAEL.

I have been secretary and manager of the Longton Gas Company since 1868. During that period I have had the conduct and management of the works and undertaking of the company. I have heard the figures stated with respect to the prices charged and the amounts expended, and they are correct, both as to what has been laid out within the mile radius and on the Blyth Bridge extension.

Cross-examined by Sir E. BECKETT: I have no doubt the corporation will reduce the price within the mile radius. In 1874 the cost of gas was 2s. 5½d. per 1000, in 1875 it was 2s. 0¾d., in 1876 it amounted to 2s. 2d.—the average price for the three years being 2s. 3¾d. The gas sold in 1874 was 41,922,700 feet; in 1875, 45,311,000; and in 1876, 48,430,000.

By Mr. YOUNG: There is one block of houses, just outside the mile radius, supplied at 3s. 6d. per 1000; but they were connected before the Blyth Bridge extension was laid. I should hardly think it fair for the corporation to reduce the price of gas within the borough, and not reduce it outside the mile radius, supposing the profit was sufficient, and the same conditions applied. A 5-inch main might be found large enough for Blyth Bridge, but the directors at the time thought the place would naturally increase, and were guided by their past experience of the different mains in Longton. The Stoke Fenton and Longton Company had mains in the town, and in 1866, when this company were formed, they laid a second set; but two or three years ago all of them had to be taken up, simply because together they were too small. The difference in price between a 5-inch and an 8-inch main would be about £770. I do not consider the first year's rental (£214) at all unsatisfactory. You cannot expect an extension of this kind to produce much at the beginning. I dare say it will increase 10 per cent., or a little more, this year. At Blyth Bridge there are only five villas unsupplied with gas, the rest of the houses are cottages. If from the actual cost of the extension to Blyth Bridge you strike off £700 or £800 for the main, and three-fourths of the parliamentary expenses, which are all put on to this extension, last year's supply of gas would give a little profit. If the consumption at Blyth Bridge is not to increase, we have spent £770 more than we ought to have done.

By the COMMITTEE: The difference could hardly be considered a saving, because there would be the friction, and condensation, and leakage, which would be more in a 5-inch than in an 8-inch main. There would be, perhaps, a difference of 5 per cent. in leakage in consequence of increased pressure.

Re-examined by Mr. MICHAEL: It would not have been economical, as we were to supply three miles distant, to lay down so small a pipe as 5 inches, because on each side there are branch roads. If I had to do the work over again I would lay down an 8-inch main, even with my present experience of a less quantity of gas being taken than I imagined would be. If we had laid the smaller main we should have been obliged to put full pressure on the whole town. It is probable this district will increase at least 10 per cent. each year.

Mr. *A. Hardwick*, the borough surveyor, and Mr. *William R. Blair*, a member of the Town Council, were called to give evidence as to the present number of consumers, and the likelihood of increase. Both thought that, at least for some time to come, there would not be any large additional consumption.

This concluded the case for the promoters.

Mr. STEPHENS and Mr. YOUNG stated they proposed to call their witnesses first, reserving any observations till the conclusion of the evidence.

Mr. *George Menzies*, examined by Mr. STEPHENS.

I am the resident agent of the Duke of Sutherland, upon the Trentham Estate, and have filled that office since 1865. The Duke's property is partly within the mile radius and partly outside. In this district there are actually existing 800 houses the property of the Duke, with an estimated population of 4800. Of the houses, 360 are supplied with gas from the main passing to Dresden and Blyth Bridge. The main was laid down for the gas company's own purposes, and merely gives a supply to our houses on the way. The majority of the roads in Florence are the Duke's own property, made by him, and kept by him in repair. None of the roads in that district are lighted with gas. The question of forming the place into a district under the Local Government Act has been a matter under consideration and preparation for two years. Arrangements have advanced so far as to prepare a scheme for submission to the Local Government Board, and are within a week of completion. The district is intersected by the mile radius. The houses in the district have been mainly built within the last dozen years, and largely within the last two years. I should think quite three-fourths of the houses have been erected since the gas company's first Act, in 1866. When the company applied for their 1875 Act, I understood the Bill to be one for supplying Blyth Bridge, and having no reference to Florence at all, and in so far I made a mistake, else I would have advised the Duke to oppose their proposals. A new colliery has been opened by the Duke within the last three years, and in connexion with it we have made large arrangements as to laying out building land and providing a system of sewerage. We have practically made all the arrangements in anticipation of a town growing up at this point, and we certainly should not have taken that trouble and incurred that expense unless we had a clear view of what was likely to happen. I have always looked forward to the feasibility of providing gas-works for the supply of the town when it had reached a population of 20,000, and have considered the arrangements so far as the site which I should propose for the works themselves. When I designed the railway on the estate, I marked the site of my proposed gas-works, more than two years ago. I have considered the limit of price which the company are empowered to charge, and, having regard to the circumstances of the district, I consider it a very excessive one, and, in the hands of the corporation, prohibitory. I certainly think that now, when matters are again submitted to Parliament, is the proper time for rectifying any mistake which may have occurred in 1875. There are 218 houses in Florence outside the mile radius, and of these I think 53 only are supplied with gas at 6s. per 1000. Inside, the price is 3s. 6d. I have no doubt at all that if the prices were less marked in point of difference an increased number outside would take a supply, and thus ultimately the company would be recompensed. The Stoke Company, whose district adjoins that of the Longton Company, have a limit of price of 5s., but I think the average price in the district is 3s. 6d. They supply the Duke's estate at Trentham, and in order to get to the Hall they have to traverse a clear mile without any connexion at all. Notwithstanding that, they find it answer their purpose to charge only 3s. 6d. and 4s. To the Duke, they supply the first 70,000 feet at 4s., and after that at 3s. 6d. per 1000. To other consumers at Trentham the price is 4s.

By the COMMITTEE: The company laid the mains all the way to Trentham at their own expense. The distance is a little over three miles from the works. The company are quite willing to go on at those prices. They pay 10 per cent., I believe.

Cross-examined by Mr. CRIPPS: The consumption at Trentham last year was 1,300,000 feet. The rents of the houses at Florence vary from 3s. 6d. a week to £50 a year. A considerable portion are of the former class. The houses are largely inhabited by working men, foremen and master potters. I think there are 360 houses in all supplied with gas.

Mr. CRIPPS: I find that is quite contrary to the evidence given upon the other side, because that was 213.

Witness: I can only say I have had the houses counted, and my assistants say 360.

Cross-examination resumed: I am not intending to establish a fresh company to supply Florence, unless driven to do it by the 7s. 6d. charge. I consider we are in a position to supply gas there for less than that price per 1000 without any loss at all. I think at the present time we could erect works at Florence and supply gas, taking it altogether, at 6s. per 1000.

Mr. CRIPPS: That is another thing. Do you know that the greater part of Florence is supplied at 3s. 6d.? You must take in that in order to make up enough to supply. At the 6s. price you must raise the 3s. 6d. people, and even then you would not be able to do it.

Witness: I really believe we could do it for less, but I put it at 6s.

Mr. CRIPPS: Do you really assume that Parliament would grant power for the erection of gas-works within the limits of another company with such a programme as you would have to lay before it?

Witness: If the other company were proposing to charge 7s. 6d., I think Parliament would listen to us.

Mr. CRIPPS: I suppose this is a new idea, because in 1875 you might have come forward with exactly the same view as now, might you not?

Witness: I might; but, as I have already said, I believed the Bill of 1875 related only to Blyth Bridge. So far I made a mistake, that is the only thing I can say about it.

Cross-examination concluded: Since 1875, about a fourth of the houses on the estate have been built. I think the price that would be charged for gas would be a prohibitory one, and check consumption. I find we have 200 houses outside the mile radius, and only 25 per cent. use gas. Whether the company have deliberately put on a prohibitory price or not, I take it to be the fact.

By the COMMITTEE: I think the price over the whole district should not be more than is charged within the borough. I do not see how it can be anything but profitable, the population being quite continuous from Longton.

Re-examined by Mr. STEPHENS: If there should be outside the boundary only eleven houses that are supplied with gas, it looks as if the price is more prohibitory still. As regards the comparative cost of laying works down, I should certainly look at it in the light the gas company did, and, with a view to the future, place an 8-inch main where a 5-inch one would do. I consider the 6s. price would have been the one to start with, and as the district grew there would be a reduction. I think foremen, working people, miners, and so on, are a class of people who would naturally take gas if they could get it on moderate terms. It would certainly be reasonable, if it could be done, to secure to a population of that class the comforts of a gas supply. Particularly would that be the case where a corporation, professing to be the public guardians, are taking the powers of supply into their own hands. The last contract with the gas company at Trentham was for seven years, and that expired more than twelve months ago. The same terms are now running without a contract, so I suppose the company found them satisfactory, or would not have continued them.

FRIDAY, MARCH 16.

Sir E. BECKETT having addressed the committee in support of the petition of the Duke of Sutherland,

The following evidence was called to support the petition of the inhabitants of Blurton and other places:—

Mr. *John Aynsley*, examined by Mr. YOUNG.

I carry on business at Longton, but have resided at Blyth Bridge for many years. The place has been going on increasing rapidly during the last few years, and, from my knowledge of the district, I am positive it will still go on increasing. At the time the Longton Gas Company obtained their Act in 1875, authorizing an extension to Blyth Bridge, they did so with the firm belief that the project would pay. I myself have no doubt whatever that it will pay at the 6s. rate, and feel confident that it would pay at a 4s. 6d. rate. My opinion in the matter is so strong that if the Town Council feel any apprehension, I should have no hesitation in paying them, should they purchase the company, the sum of £3234 5s. 10d. down in hard cash, give them 2 per cent. in addition, and accept a 5s. maximum for Blyth Bridge, or beyond the mile radius, for three years, and after that I would accept a maximum price of 4s. 6d. I am prepared to do that now, and have no objection to the town-clerk at this moment drawing up a document to that effect.

Mr. YOUNG: Do you think yourself that the interests of the people at Blyth Bridge, and the outlying districts, will be in as safe keeping in the hands of the corporation as in those of the board of directors of the company?

Witness: I should be rather sorry to trust them—they are birds of passage.

Mr. YOUNG: I presume the corporation have more interest in keeping down the rates in Longton itself than outside?

Witness: When a gentleman is appointed to the honourable position of mayor of a town, he is very anxious to distinguish himself, if even it is at the expense of the outlying districts. Positively I think the outsiders will be in a worse position than now if the corporation acquire the undertaking. The directors of the company have no object or interest—nothing to gain in serving one part of their consumers in preference to any of the others.

Cross-examined by Mr. MICHAEL: I am one of the directors of the company, and was so when the 1875 Act was passed. I am also a consumer of gas in the Blyth district. One of the reasons that influenced the directors to make the extension in that district was that my property should be supplied with gas.

Mr. MICHAEL: In the promotion of that Bill, did not you, as a director, arrive at the conclusion that, if a maximum less than 6s. 8d. was inserted, you would withdraw that portion of the Bill?

Witness: As a director personally concerned in the interests of the company, and anxious to do my duty as a director, I considered it was better to erect a 14-inch wall to protect the interests of the company, when it could be done at other people's expense, than put up a 9-inch wall.

Mr. MICHAEL: You were to be the main contributor to the expense incurred. You were to be the largest consumer of gas in the new district. Therefore, you erected a 14-inch wall against yourself?

Witness: Yes, but my interest as a shareholder in the company was paramount.

Re-examined by Mr. YOUNG: The prices of coal and iron at the time the Bill of 1875 was deposited were very different to what they are now. At the present time they are not quite so low as they existed before 1871, but very nearly. Supposing we were promoting the Bill now instead of in 1875, I should say unquestionably we could take gas to Blyth Bridge at a 4s. 6d. maximum.

The CHAIRMAN: Have you ever considered in your company the question of reducing the price at Blyth Bridge?

Witness: It was quite understood, as far as the directors were concerned, that the price was to be reduced, but as we do not profess to be an exception to human nature, we took positive steps to protect ourselves first. The inhabitants of Blyth Bridge were rather restless, so far as the price of gas was concerned. The greatest part of them happen to be manufacturers in the town of Longton, or had been residents in it, and having paid 3s. 6d. per 1000 for their gas, one can easily understand, looking at what human nature is, that it becomes very susceptible when it has to pay 6s. for a mere extension of something like two miles.

The CHAIRMAN: My question was, have the company ever thought of reducing the price at Blyth Bridge?

Witness: They have not. The Act has only been in operation a short time, so that this question has not been brought before them, but the circumstances are such that I feel satisfied the directors would be justified in making the reduction.

The CHAIRMAN: I suppose at the time the Act passed the inhabitants of Blyth Bridge in some way acquiesced in the arrangement made, which was a maximum price of 7s. 6d., and an immediate rate of 6s. I want to understand from you, speaking in your character of an inhabitant of the place, whether the inhabitants generally had any prospect that the price would subsequently be reduced below 6s.?

Witness: They were anxious to have the gas, and it was suggested the people should get up a requisition to ask the directors to do these things. It is my impression that the town-clerk of Longton, who is solicitor for the gas company, drew up the requisition, and the people of Blyth Bridge signed it; because we, as directors, considered it would help us very materially in getting the Act passed. I know very well, and I appeal to my learned friend the town-clerk whether it was not so, that he considered he gained a very great victory, inasmuch as the council pooh-poohed the very idea of 7s. 6d.; but he said, "Let us try. We shall lose nothing, and we may gain."

The CHAIRMAN: Was there any prospect held out to the inhabitants of Blyth Bridge that at any future time the rate would be reduced below 6s.?

Witness: Positively so. They have been repeatedly told that the price was very high, but they should have a little patience, and no doubt it would soon be reduced.

Mr. *John Doxy*, examined by Mr. YOUNG.

I reside at Blyth Bridge, and have erected many houses there. I agree with Mr. Aynsley that there is every prospect of the place still increasing rapidly, as it is the only outlet there is for Longton and the Potteries that way. The rents of my houses have gone up from £20 to £30, and, in some cases, as high as £40. When the company were projecting their Bill in 1875, the directors, or several of them, were very favourable towards accommodating us; and from what I understood, in a conversation I had with them, the price was to be reduced according to the consumption—that as more gas was taken the less rate we should have to pay. Taking all my houses, those which I still have and those which I have sold, mine is the only one that uses gas, on account of the price being so high. My tenants will not take it unless the company lower the price, say, to 4s. I feel so certain that it would be a benefit to the company or the corporation, whichever may have the undertaking, to reduce the price of gas in and about Blyth Bridge, in order to obtain a more extended consumption, that I would be quite willing to join Mr. Aynsley in the purchase of our part, and pay down the money.

Mr. *William Keary*, examined by Mr. YOUNG.

I am the solicitor to the Stoke Gas Company, and am able to confirm what was stated yesterday, that gas is conveyed to Trentham, and supplied there somewhat extensively. The Stoke Gas-Works have been a profitable undertaking. The capital is £40,000, of which £30,000 is called up, and we have paid 10 per cent. on the whole of that from the passing of the Act in 1858. The distance from Stoke to Trentham is a little over three miles. The gas is supplied to the Duke of Sutherland and the other inhabitants of Trentham at 4s. per 1000 feet, unless a certain consumption is arrived at, when it is reduced to 3s. 6d. Throughout the rest of the district of Stoke it is 3s. 6d., which, no doubt, will very soon be reduced to 3s. 3d. The district of Stoke, except the Hall and the cottages belonging to it, is a much less thickly populated district than the Longton district; it would contain about the same population, but much more scattered.

Mr. YOUNG having addressed the committee in support of the petition, and Mr. MICHAEL having replied on the whole case,

The CHAIRMAN said the committee had decided to pass the preamble of the Bill, with the condition that the present limits of prices should continue till the end of 1879, and after that 4s. should be the maximum price outside the one-mile radius.

Mr. MICHAEL stated that he was authorized, on the part of the promoters, to accept the terms which the committee had imposed, and, in reply to Mr. Stephens, said he was willing to put in a clause expressly providing that the price to be charged within the mile radius should be uniform, though that was already provided by the existing Act.

The CHAIRMAN said the committee did not intend to interfere with the price to be charged inside the mile radius.

The clauses were then read and agreed to, and the chairman was directed to report the Bill to the House.

MONDAY, MARCH 19.

(*Before Mr.* ASSHETON, *Chairman; Messrs.* SMITH, BELL, *and* DUNDAS; *Mr.* BONHAM-CARTER, *Referee.*)

RAMSGATE LOCAL BOARD BILL.

(*Continued from page* 539.)

On the assembling of the committee this morning, some further correspondence between the local board and the companies was read, from which it appeared that the board had made a fresh offer for the purchase of the gas company for £110,000, and £57,750 for the water company, in place of their former offer of £117,000 and £62,750. The companies, however, declined to consent to negotiation upon those terms, and the case proceeded.

Mr. *G. Hill*, examined by Mr. O'HARA.

I am proprietor of the "Belle Vue" Hotel at Pegwell Bay, and am one of the overseers of St. Lawrence. I have about 40 lights in my house, and previous to 1875 there was very great difficulty in obtaining gas. I desired to have a stove for cooking purposes, but Mr. Phillips, a gas engineer, examined the gas, and told me it would be money thrown away to have such a stove. I may say that every one of the inhabitants in West Cliff Terrace has sent for me, as overseer, to complain of the gas. The price at present is supposed to be 4s.; but I find that my last quarter's bill averages the same as when it was 5s. 6d. The public lamps are better now; but the year before last they were continually going out. I have often sent my own men to relight the lamps in my neighbourhood. I have always been of opinion gas and water-works should belong to local boards or town councils. I consider the maximum charge for gas in the Bill of the company—5s. 6d.—is too high, having regard to the capital embarked, and to that proposed by the Bill. I also think it would be a great temptation to the company to keep the price as high as they can, it being their interest to obtain the best dividends. The supply of water has been much better this year than it was before.

Cross-examined by Mr. LEIGH: We have had no cause to complain of the gas for the last six or seven weeks; it has been as good as I could wish to have. The winter before last I was continually making complaints to the gas company. I may have consumed more gas since the price was reduced to 4s.; but we have no more burners than we had then.

Mr. *N. B. Kennard*, examined by Mr. O'HARA.

I am a tailor and outfitter in Hardres Street, Ramsgate. I have complained to the manager of the gas-works several times about the supply of gas, and a larger service-pipe from the main was laid down, which certainly made an improvement, although at times since then there has been a great deficiency. My workpeople have been very much troubled to get on with their work, more particularly on Saturday evenings. My water supply is very good; I cannot say a word of complaint against it.

Cross-examined by Mr. MICHAEL: I have had to complain of the gas since the new pipe was laid. We have complained very much of the want of heat in the summer time, when we have, of course, to start men to work, and when we require a greater amount of heat for carrying on the work. I have two meters, one is a 30-light meter, carrying 20 lights and a heating

apparatus, and the other is a 5-light meter, which supplies about 16 or 17 lights. I was told the latter meter was sufficient, and it was supplied by the gas company.

Mr. *J. Clark*, examined by Mr. O'Hara.

I am a gas-fitter, in business in High Street, Ramsgate. The supply of gas for cooking purposes is very inadequate. People have refused to purchase gas-stoves on that account. I have frequently had complaints from customers of the want of illuminating power in the gas. I consider the way in which the gas is supplied to be rather dangerous; the pressure is so small during the day, and the sudden turning on in the evening has in many cases thrown up the light to such a degree that I have seen it set things on fire. The pipes have frequently been very much corroded, and also the metal fittings.

Cross-examined by Mr. Leigh: The last complaint was made not more than a week ago. I have not complained to the gas company lately, but I have advised the customers to do so. I should think I have had 20 complaints from customers during the last 12 months.

Mr. Leigh: In the last 12 months how was it, if you had 20 complaints from your customers—you being in the position in which you are, as a gas-fitter—that you made no complaint to the company?

Witness: I told you before; I sent the customers to complain themselves. One customer who complained was Mr. Eve, and that complaint was made last Thursday, since the present inquiry began. I do not recollect exactly what I told him, but I said we had done all we could to give him a supply of gas. He has been pressing for 11 years to obtain a good supply; he has had new pipes put in, and now he does not get sufficient gas.

Mr. Leigh: Will you mention another complaint during the last 12 months?

Witness: I have not been keeping cases all ready, and making notes of these things.

Mr. Leigh: You tell the committee that there have been frequent compaints from your customers—will you name one?

Witness: Before that time I can name another—Mr. Rew; that was a year and a half ago.

Mr. Leigh: Then you jump from last week to a year and a half ago. Is there any other you can name?

Witness: Mr. John Derby. That was not above a fortnight ago. I did not tell him to complain to the gas company, because he knew how to go about it better than I could tell him.

Mr. Leigh: May I take it generally that you yourself have never—for some time past, at all events—made any complaint to the gas company?

Witness: No; I left off doing so, because I got no redress if I did.

Mr. Leigh: You are making accusations against the gas company, so I must ask you when you did make a complaint?

Witness: The last time was a twelvemonth ago. It was not in writing. I complained to Mr. Valon, the manager, of there being a very slack pressure of gas, and he said they could not put more pressure on. He said there was always a good stock of gas, and so on, but still there was not the pressure that was required for boiling a kettle on a gas-stove. He also told me he should not put any more pressure on because of the leakage in their mains, and I thought if that was the case there was no use in going to them any more.

Mr. Leigh: You have given in three or four cases in which you say there have been complaints made to you; do you remember any others? Let us have them all, if you please, that we may meet them.

Witness: I have not had time to make a memorandum of this sort of thing.

Cross-examined by Mr. Browne: The complaints made were not about my fitting. I do not know why the people complained to me about the gas.

Re-examined by Mr. O'Hara: When I complained to the manager he said the extra pressure required would cost them more in waste of gas, through the leakage of the mains, than the customers would be worth.

By the Committee: A 5-light meter would not supply 17 Argand burners; but for bat's-wing or fishtail burners I should say 15 is about the general run for a 5-light meter.

Mr. *A. Bonner*, examined by Mr. O'Hara.

I am a baker and pastrycook, living in Queen Street, Ramsgate. We begin to use gas at four o'clock in the morning, but have found all day great difficulty in obtaining a supply. I have been obliged to substitute fuel for gas.

Cross-examined by Mr. Leigh: I get a good supply of gas when it is turned on in the evening. I have not made any personal complaint to the company, because I thought it would be useless.

Mr. *T. Clarke*, examined by O'Hara.

I am a grocer, carrying on business in Harbour Street, Ramsgate. I have complained to the company, and they suggested I should have a larger service, which I had to put down at my own expense. It cost me 18s., and I thought it was unfair I should have to do it. The complaint against the gas company is very general.

Cross-examined by Mr. Leigh: I should like to see the supply of gas transferred to the local board, of which I am a member.

Mr. *J. W. Barry*, examined by Mr. O'Hara.

I have been the Medical Officer of Health for Ramsgate for four years, and have made extensive observations during that time with regard to the supply of water. I found that the officers of the company exercised no supervision whatever over the cisterns and fittings of the consumers. The quantity supplied is totally inadequate to the resident population, and as regards the visitors the supply is much more inadequate. In 1874 I had to go to a house on account of there being a case of scarlet fever there, and after having made general inquiries about the case, I went to look at the sanitary condition of the house, and when I went to the water-closet I found the supply was from a pipe coming directly from the main, and the people of the house told me that during the whole time the water was on—which would be about an hour and a half—the water rushed in and went down the drain, and that that condition of things had continued for the whole time they had been tenants of the house. The danger attending that state of things would be very great, because, in the case of an intermittent service, when the water is turned off, a vacuum is caused in the pipes, and that being the case, if any foul gases or matter should be in the pan, they would be sucked into the mains at the moment of intermission. I have found great inconvenience in my own house, and complained to the water company, and they told me the pipe was too small, but that can hardly be the case, because in winter, when the demand is less, I find the tanks are tolerably well filled, I think the town of Ramsgate has suffered most materially as a health resort on account of the insufficiency of the water supply for many years past; there should certainly not be less than 20 gallons per head per day, exclusive of water required for other purposes, such as sewers, fires, &c. Until three years ago there was no supply from about two or three on Saturday afternoon until seven on the following Monday morning, which was a cause of grave nuisance, because the water-closets were left for 36 hours without a drop of water to flush them. The main sewer was blocked up about twelve months ago, and in my opinion that was due to insufficient flushing. In 1875 I made a written report to the local board, calling attention to the danger the town was exposed to from the insufficiency of the water, and urging them to obtain a constant supply, but they have not succeeded in doing so, because the application has been ignored entirely. With regard to the gas, I have found the illuminating power to be of the lowest possible order. I should almost prefer a good rushlight, if it were well snuffed.

Cross-examined by Mr. Michael: The quality of the gas was so bad that I could not read by it, and therefore I had to use a lamp as well. The mortality in Ramsgate last year was about 21 per 1000, and the year before about 14, I think. The excess of mortality was chiefly during the summer months, but it occurred at all periods of the year, and was very much higher than it should have been. I attribute the mortality to the spread of scarlatina, and that I attribute to the bad condition of the poorer cottages, and that again I attribute to the insufficient supply of water. We have enforced a supply to all the cottages as far as we could, but it is an old saying, that you cannot get blood out of a stone, and, so far as my experience goes, you cannot get water out of the water company.

Mr. Michael: I suppose you have inspectors of nuisances, who report to you from time to time the condition of those houses in which epidemic diseases appear, or are likely to appear. Is it not a part of your duty, as Medical Officer of Health, to visit the premises where epidemic diseases occur?

Witness: It is part of my duty, and I do it in every instance which comes to my knowledge.

Mr. Michael: Your inspectors have access to all these properties, and to all places in the condition you have described?

Witness: They have, if they can get in, but at times they are refused admission. I know that is against the law, but it is not always easy to carry out the law.

Mr. Michael: Are you not aware that at this very time the water company are seeking exactly the powers which you say are necessary—to give a constant supply of water, and to have the power of inspecting the fittings, and seeing they are properly kept?

Witness: I have not an intimate acquaintance with the Bill of the water company, but, as far as my knowledge goes, when they obtained their Act many years ago they promised to give the town a constant supply, but that they certainly have not done.

Mr. Michael: Putting out of view these water-closets, which you say you cannot control, will you say how the absence of water tends to produce scarlatina?

Witness: It is most important, in the case of scarlatina, that the children, or any one who is suffering, or who has suffered from the disease, should be well bathed—that they should have a bath every day; and if the people cannot get sufficient water for their closets, they certainly cannot get sufficient water for baths, and, consequently, the spread of the disease would, by that means alone, be most materially increased.

Mr. Michael: The present water supply being so insufficient, what provision is there in the Bill of the local board to give a better supply? How will it be made better by spreading it over 24 hours instead of over two?

Witness: They will have to go to other places, I suppose. I do not think it is at all impossible that the Isle of Thanet or the neighbourhood of Ramsgate could yield a further supply if proper adits were driven.

Cross-examined by Mr. Browne: I believe it is the case in some parts of London that the supply is only turned on for an hour a day; but it is no reason why, because they do wrong in London, we should do wrong in Ramsgate.

Re-examined by Mr. Venables: I believe it is the intention of the local board to go to Minster if they cannot get water enough from Whitehall. I am aware that the company had the power of cutting off the supply of water from any house when the fittings were not of a character to satisfy them, and, consequently, they had the most efficient of all modes of securing proper fittings, if they had chosen to exercise it. I do not know what their legal powers are, but I know it is stated in one of their notices that if there is a waste of water the consumer will be fined so much. If the company had obtained their Bill last year they would have been under compulsion to give a constant supply.

By the Committee: When deaths occur, before calculating the death-rate I always ascertain whether the person who is dead is a resident or non-resident; if the latter, I eliminate the death, because if I were to include it, it would make my returns absolutely worthless. With a population which during four months of the year is doubled, one must take some datum to go upon, and the only reliable one is to take the standing population, and to eliminate the deaths of visitors.

Mr. *J. B. Thompson*, examined by Mr. Venables.

I am a surgeon, residing at St. Lawrence, and am medical officer to the coastguard. In my opinion the water is very good, but deficient in quantity. I have no personal interest in the matter, but I think the local board should have both the supply of water and gas—the former especially, as a necessary of life.

Mr. *A. J. Jarman*, examined by Mr. Venables.

I am a photographer, but was formerly engine-driver at the Ramsgate Gas-Works. About 1869 or 1870 a well was sunk at the gas-works with the intention of obtaining water for their own supply at the works; but after sinking to a depth, I think, of 80 feet in the chalk, the water was found to be completely contaminated with ammoniacal liquor and also with tar, so that we could not use it in the steam-boilers. Mr. Curling, who was then chairman of the gas company, asked me to pump some up, and he saw the condition of it, and it was generally admitted to be unfit for use. That state of things went on for some time; but it was three months before the water became clear, although it was never to my knowledge suitable for drinking purposes. When I was at the gas-works, complaints were often made respecting the state of the gas, and after those complaints were made an order was received in the retort-house to use some cannel for a few days, to improve the quality. At the present time the gas is satisfactory, but a short time since it was very bad. Some time last November I tested the gas for my own amusement, and found a very appreciable quantity of sulphuretted hydrogen. The test I applied was a solution of nitrate of silver, and also acetate of lead, turning on the gas and holding a paper over it while wet, when the paper became brown.

Cross-examined by Mr. Michael: There is always more or less salt contained in our water, but I have noticed it more particularly about August, when there is the greatest draught upon the water. I use a precipitate of silver from my waste bath solution, the water containing sufficient chloride to precipitate it. In winter I have to add salt for my own especial purpose.

Mr. *G. W. Stevenson*, examined by Mr. Venables.

I am engineer and adviser to many gas and water companies, and local authorities who have the control of the gas. Before I was consulted by the promoters of the present Bill, I was spoken to by persons at Margate about a proposal for a competing company. That was about two years ago, and the then Mayor of Margate took an active part in the matter, but he died before the Bill went before the committee, and it was withdrawn. That Bill included a power for the company to sell to the corporation. For some time past there has been considerable dissatisfaction amongst the consumers of gas in Ramsgate and Margate and the consumers of water in Ramsgate. The two companies are very closely connected, having the

same chairman and the same solicitors, and their policy seems to have been very much the same.

Examination continued by Mr. BIDDER (Mr. Venables having to retire from the room): I am aware that both companies are applying for parliamentary powers, and have seen the Bills, but I think it is not in the interest of the ratepayers—nor even of the consumers of gas and water—that those powers should be granted. I am aware that the capital actually called up was only £16,000, while the nominal capital was £24,000. Since 1862 the company have paid 10 per cent. dividend upon the £24,000, which is 15 per cent. upon the subscribed capital of £16,000. I am also aware that the company allege that large sums, amounting to something like £48,000 in addition, have been spent upon capital account.

Mr. BIDDER: Is that method of dealing with their revenue and of extending their works consistent with the provisions of the Gas-Works Clauses Act, and the policy which Parliament has adopted in such cases?

Witness: Certainly not. They have never put themselves under the provisions of the Gas-Works Clauses Act, and it is not even consistent with the Act under which they are working, because they were authorized to raise £24,000 of share capital, but they only raised £16,000, so that they have not exhausted the powers which were conferred upon them in 1834.

Mr. BIDDER: Then I understand your view to be, that it was inconsistent with their parliamentary obligations to be taking money out of surplus revenue for capital purposes, when they had not exhausted their capital powers?

Witness: Certainly; I consider that a breach of their obligations to Parliament.

The CHAIRMAN: You must remember that the Bill immediately before us now is the Bill of the local board.

Mr. BIDDER contended that all the Bills were in competition, and must be taken together.

Mr. MICHAEL dissented from that view, because the committee might feel it their duty, in the public interest, to pass all three Bills.

After some conversation on the point,

The CHAIRMAN said the feeling of the committee was in favour of taking them as competing Bills.

Mr. BIDDER (to witness): Probably, you have observed a statement in the preamble of the gas company's Bill to the effect that, provided the capital be declared and readjusted as hereinafter mentioned, it is desirable that the company should be subject to the powers, regulations, and restrictions of the Public Act.

Witness: I see that is part of their preamble, and I judge from that, if the capital be not declared and readjusted as mentioned, the companies will hold themselves at liberty to withdraw their Bills, as they did last year.

Mr. MICHAEL said he did not see what Mr. Stevenson—who was a most eminent engineer—had to do with the construction of a section of the preamble.

Mr. BIDDER: As regards the first proposition in their Bill—that they should have 10 per cent. upon the whole £24,000, including £8000 taken out of accumulated profits—is that, in your judgment, fair to the ratepayers?

Witness: No; and it is not consistent with recent legislation.

Mr. MICHAEL: What is not?

Witness: That they should be permitted to capitalize their profits, or any portion of them, at 10 per cent.

Examination resumed: Even supposing those profits had been properly and legally applied, the maximum dividend they would be entitled to, in accordance with past and present legislation, would be 5 per cent. As to the £48,000 upon which they ask 6 per cent., they will have to prove that they have spent that amount upon the works, and then they will be allowed 5 per cent.

Mr. BIDDER: I do not know whether you consider it to be an element in the consideration of what they would be entitled to in respect of capital out of accumulated profits, whether during the time that they were taking that money out of revenue they were dividing a full dividend of 10 per cent., or whether they were pinching their dividend for the purpose of saving money?

Witness: It would be an element, no doubt, in the consideration of how far they should be permitted to capitalize their profits.

Mr. BIDDER: An ordinary gas company, under the Gas-Works Clauses Act, when they have divided up to 10 per cent., and made up their reserve-fund, must reduce the price, and give the consumers the benefit of it; therefore, in taking money out of revenue, and profit over and above 10 per cent., and applying it to capital purposes, they are taking money which, if they had been a company under parliamentary restrictions, would have been necessarily returned to the consumers?

Witness: Yes. With regard to the maximum price of 5s. 6d. in the Bill of the company, I say it is too much. The gas now costs them 2s. 6d. per 1000 feet, and it would require 11d. per 1000 feet to pay 10 per cent. upon £16,000, and 5 per cent. upon £56,000, and then there ought to be added a margin for contingencies. The price, therefore, ought to be from 4s. 6d. to 5s. Of course, it does not follow that because 5s. 6d. is inserted in the Bill they are to charge that amount.

Mr. BIDDER: Let me draw your attention to a statement which Mr. Bramwell gave in evidence last year, that the consumers of gas were £19,000 better off than if the company had applied to Parliament, 15 years ago, for a Bill authorizing an increase of capital at 10 per cent. dividend.

Witness: It is not the practice of Parliament to give companies additional capital at 10 per cent.; but, supposing it was so, Mr. Bramwell is incorrect in his calculation to the extent of £11,220. [Witness handed in a number of statements showing the points of difference between himself and Mr. Bramwell.]

In reply to the COMMITTEE, witness said the figures were all supposititious, and the calculations were simply made for the purpose of refuting the statements made by Mr. Bramwell last year.

Examination resumed: I cannot tell exactly how the company expended their capitalized profits—whether in an equal sum year by year, or in a large sum one year, and a small sum the next year—but I have taken an equal sum year by year as being fair. The total amount which could have been paid, £134,540, and the total amount actually paid, £115,320, leave £19,220, which Mr. Bramwell says, by using capitalized profits, the consumers are better off than if the company had gone to Parliament and raised their capital in the ordinary way. I say, however, that in this mode of calculation Mr. Bramwell has overlooked the fact that, in addition to the sum of £48,000 which was taken out of the profits, there were two other sums of £4000 each, also taken out of profits and capitalized, and the calculation should have been as follows:—Total dividend paid, £67,320; add £4000 taken out of profits in 1847, and again another £4000 taken out of profits in 1862, and the £48,000 which they admit to have taken out of profits since 1862, making a total of £56,000, or £120,320 taken out of the consumer's profit. Then deduct that from the £134,540, which they could have taken out of their profits if they had applied to Parliament to obtain 10 per cent. on the whole of their capital, and it leaves only £11,220, instead of £19,220. There is a great deal to be said on the other side, but I have put it in the most favourable way I could for the company. I have given them 10 per cent. on the whole of their £24,000 of authorized capital, £8000 of which was simply written up, and 7½ on all the new capital they require; that comes out at £62,405. That would represent the total amount they could have divided amongst themselves if they had applied to Parliament and obtained 10 per cent. upon the £24,000, and 7½ per cent. upon the £48,000, Then I have taken the last 15 years, because Mr. Bramwell did the same; the total amount which would have been paid during that period is £62,405, but the total amount actually paid to the shareholders was £35,400. The amount taken out of profits, and capitalized in 1862, was £4000, and since then £48,000, making together £52,000, which, added to the £35,400, makes £87,400, showing practically that £25,000 has been taken out of the pockets of the consumers during the last 15 years more than should have been taken out, and more than would have been taken out if they had been under parliamentary control.

Mr. BIDDER: It occurs to me (to put it shortly) that in most cases the undertakers find the capital and the consumers find the dividends; but here the consumers find both the capital and the dividends, except the original £16,000.

Witness: That has been so; the property has been created, with the exception of £16,000, out of the consumers.

Mr. BIDDER: I think in their Bill they treat the matter as if £72,000 in all had been expended upon the undertaking—that is to say, £24,000 and £48,000; and in 1876, I believe, it appeared that it did not constitute the whole of what they had expended out of the profits of the undertaking.

Witness: No; Mr. Curling proved, in 1876, that £79,972 had been expended on the works, and as only £16,000 had been suscribed, it is obvious that the difference had been contributed by the consumers. I have never had experience of a company so outraging their parliamentary obligations as this company have done; and seeing that it is a monopoly, and was intended to be a regulated monopoly, if the company have so evaded their obligations, I think it is quite the turn of the consumers now, and that the company ought to be made to hand over their concern to these consumers. I find the water company have been pursuing, to a considerable extent, the same policy; but they have only written up £1000 of capital, instead of one-third. They now represent themselves as having expended £19,000 out of profits, upon the extension of their works. In my judgment, these works are not adequate to the requirements of the town. The reservoir is much too small; it should contain two days supply, which would not be less than 2 million gallons, while it will only hold 600,000 gallons, or less than one-third. Mr. Bramwell said, last year, that the consumers of water were £10,500 better off than they would have been had the company obtained an Act of Parliament 15 years ago to authorize the increase of capital; but there was the same rather wild hypothesis on that gentleman's part, that Parliament would have let them have additional capital at 10 per cent. [Witness handed in another set of calculations, based on the same principles as those with reference to the gas company.] In the sum of £10,500 mentioned by Mr. Bateman, he has omitted to note that £1000 of the £15,000 has been written up, and I correct his statement of £10,500 by the sum of £1000; so that, upon his own showing, it is only £9500, instead of £10,500, even supposing the company could have got 10 per cent. on the invested capital from the day they began business until now. I also show that if the company had 10 per cent. on the original subscribed capital of £9000, 5 per cent. on the capitalized profits of £1000, 10 per cent. on the further additional capital of £4950, and 7½ per cent. on the remaining capital, they would have received £33,775, whereas the amount actually paid the shareholders during the last 15 years, and the profits capitalized during those years, amount to £38,735; in other words, that they have taken £5000 out of the pockets of the consumers during the period, instead of the consumers being £10,500 better off than if the company had applied to Parliament. I made another calculation on the assumption that they had 10 per cent. on all their subscribed capital, and 5 per cent. on their capitalized profits; and, according to that statement, the consumers are £9000 worse off than they would have been if the company had applied to Parliament, and had their capital authorized in the proper way.

Mr. BIDDER: Suppose both the gas and water undertakings were transferred to the local board, at what rate would any future capital be raised which was required for extensions?

Witness: Including sinking-fund and one thing and another, I dare say it would amount to 5 per cent.; that would be the gradual redemption of the property.

Mr. MICHAEL: Over what period, should you say?

Witness: Eighty years.

Examination resumed: I think for the sanitary interests of the district it is essential the water-works should be under the control of the Sanitary Authority. The local board are the custodians of the public health, and water is a sanitary agent; therefore I think the local authority ought to have the control of the water supply. Then, again, I think it is very desirable that everything which interferes with the streets or roadways ought to be under the control of the local authority—such as gas, water, and sewers. I have frequently known streets newly paved to be literally destroyed by a gas or water company immediately coming and ripping them up from end to end; but such a thing never happens when these public works are in the hands of a local authority, because these matters are arranged by the chairmen of the various committees. What is called a 5-light meter, with an inch pressure on the main in the streets, is amply large enough to supply 17 or 20 lights.

Cross-examined by Mr. MICHAEL: I do not know a single instance in which more than 5 per cent. has been allowed on capitalized profits.

Mr. MICHAEL: What do you say to the Devonport Water Act of last session?

Witness: I do not know of anything more than 5 per cent. with regard to water, but I have not taken out all the precedents of last session. I have the cases of Harrogate, Skipton, Eastbourne, and Padiham, in none of which was more than 5 per cent. allowed. The case of Devonport must be purely exceptional. I can cite a number of cases in which Parliament has refused to allow any capitalization of profits. The Gaslight and Coke Company, only a few years ago, wanted to capitalize £360,000 of profits, and Parliament refused it *in toto*.

Mr. MICHAEL: But is it not the fact that in that case Parliament allowed them 10 per cent. on £1,000,000?

Witness: Yes, of new capital; but that is a point upon which I have not been examined. The legislation in a metropolitan case cannot, however, be applied to provincial companies, or *vice versâ*. One of the advantages to be derived by the inhabitants of Ramsgate taking the control of the gas into their own hands is, that while directors of companies such as these are very inaccessible and very difficult to bring pressure to bear upon, the local authority are directly responsible to the ratepayers, who are the consumers; and if they do not act as the consumers wish, they can be removed at the elections. There would be very great difficulty in a stranger setting up to provide Ramsgate and Margate with gas, because they would not be allowed to break open the streets.

Mr. MICHAEL: Are you aware that it has been held by the Court of Queen's Bench that it is not necessarily a nuisance to open the streets?

Witness: I am not aware of that, and should like to know what case it is. Then there is the law of trespass which comes in; you must lay your

pipes in some one's soil, and the common law vests the soil in the adjacent owners on each side of the road. That is a point upon which I happen to have some special knowledge, because I was concerned in a case at Broadstairs where a person, laying his pipes in the soil, was compelled to remove them.

Mr. MICHAEL: Do you contemplate that any profit would be derivable by the local board; and, if so, are those profits to be divided among the persons who are consumers and the non-consumers of gas?

Witness: Yes; half the profits are to be allocated under the Bill to the consumers of gas, and half to the ratepayers; but I do not assume that the same amount of profit would be earned by the local board as would be earned by a gas company, in order to pay a 7 per cent. maximum dividend.

Mr. MICHAEL: You would not advocate that a gas company should be compelled to part with their undertaking to a local authority without being paid an adequate amount?

Witness: No; and I think a well-conducted company ought not to be called upon to part with their concern upon any terms whatever—that is to say, a company that really fulfilled their obligations to Parliament and the public.

Mr. MICHAEL: Supposing Mr. Bramwell's figures to be correct, and that in reality no pecuniary loss has been entailed upon the consumers up to this time, and that now the company are placed under parliamentary restrictions, what is the advantage then which is to accrue to the consumers from the transfer of the undertaking to the local board?

Witness: None at all, supposing your statement to be correct; but you are putting a mere suppositious case. Mr. Bramwell assumes that they paid 10 per cent. on their expended capital every year since they began business, up to the end of last year.

Mr. MICHAEL: Supposing the Gas-Works Clauses Act of 1847 had been in operation in 1824, surely Mr. Bramwell would have been right in calculating 10 per cent. upon the additional capital?

Witness: Yes; because the Gas-Works Clauses Act gave, and does give, companies power to pay dividends until they reach 10 per cent.

Mr. MICHAEL: Supposing they had earned less than 10 per cent. during the first ten years, and subsequently had earned additional profits, they would have been able to recoup themselves the amount of their loss from year to year until they came to the first year; and, therefore, if they had surplus profits, Mr. Bramwell would be right in taking 10 per cent., supposing the operation of the Gas-Works Clauses Act to have gone back to 1824?

Witness: He is quite right in taking 10 per cent. upon the subscribed capital from the beginning of the company till now, but not in taking 10 per cent. upon the capitalized profits.

Mr. MICHAEL: Supposing there had been a power to raise £150,000 in the Act of 1824, and the company were subject to the Gas-Works Clauses Act, would they not have saved the £19,000 which Mr. Bramwell mentions?

Witness: That is a state of things which could not by any possibility have obtained. Parliament would not have given them £150,000 for the supply of the Isle of Thanet with gas in 1824. I should think from £600 to £700 of capital per million feet would be required at Ramsgate, but there are many companies which work with much less than that. I know many companies that are working with less than £400, and others where it is over £1000. With regard to water, the requirement of a district is the maximum daily requirement of the maximum population; in regard to gas, it is the maximum nightly requirements of the consumers. I have told the local board that if they acquire these undertakings they will have to incur a very considerable expenditure with regard to water.

Cross-examined by Mr. BROWNE: It is quite true that the ratepayers in St. Lawrence would not influence the election of the Ramsgate Local Board, but the consumers in St. Lawrence would get the benefit of the influence which the Ramsgate ratepayers would exercise upon the Ramsgate Local Board.

Re-examined by Sir E. BECKETT: I do not think it unfair to charge those at a distance from the source of supply something more than those who are near, because the cost of distribution, collection, and supervision is greater. In the case of Lincoln, the company were allowed to capitalize profits amounting to £36,500, at 5 per cent.

Mr. *A. Penny*, examined by Sir E. BECKETT.

I have had 30 years experience in connexion with gas-works, and know Ramsgate and the neighbourhood very well. I never heard a case entirely on all fours with the present, although there are one or two cases very like it—viz., Rochester and Bradford. Those cases were parallel to this extent, that, instead of going to Parliament to ask for more capital when they required it to extend their works, they chose to pay for them out of profits. The Rochester Company obtained permission from Parliament to capitalize only a portion of their profits, but the Bradford case was settled by agreement, although upon very different terms to anything we are talking about here.

Sir E. BECKETT: About the financial position of the company—the undivided profits, according to their statement, amount to £48,000, and you say that, in one case at least, a portion of the profits have been recognized by Parliament. How much do you think there is any reasonable case for recognizing here?

Witness: The sum I have arrived at is £27,000, ascertained as follows:—I have divided the period of their existence into two. I find that they raised first £16,000, and they made profits in excess of what they gave to their shareholders up to 1862, equal to £8000. In 1862 they had no doubt exhausted their parliamentary powers of raising capital, inasmuch as they had spent both the £16,000 that they had contributed by shares, and also the £8000 which they had accumulated as profits; therefore, at that period, there is no doubt that they were in a position of absolute destitution as regards the power of raising capital. Then, assuming that they had carried out their parliamentary obligations, they would have found it necessary to apply to Parliament for more capital. If they had obtained power to raise at that time the sum they spent—say, £48,000, and we had in Mr. Curling's evidence that they spent it at certain periods, so that by 1876 they had spent £48,000—they would have been entitled, if they had obtained parliamentary sanction in 1862, to pay a dividend of 7½ per cent. upon that. I say that these sums put together would have been such a sum as would, if that calculation had been made, have given them just the sum of £48,000 less £21,000—that is to say, their profits, giving the shareholders 7½ per cent. for the £48,000, would have left a sum of £27,000 only, as a sum which they might fairly ask to capitalize, because they would have had during the whole period up to 1862 a fair sum for dividends, and 7½ per cent. upon the capital they would have raised—that is, £48,000. Therefore, I say there is £21,000 in excess of what they could have given to their shareholders if they had come to Parliament in 1862.

Sir E. BECKETT: In that calculation you are giving them the benefit of the two sums of £4000, which they took out of the profits to make up their original £24,000?

Witness: Yes; as they had the parliamentary right of raising £24,000, although they only raised £16,000, and they had made profits to the extent of £8000 in excess, I thought it fair to give them the benefit of that, because they might have put it into their pockets and then called it up again; therefore, I have given them the benefit of the whole £8000, as something which should be considered as their capital. I find that, taking the dividend which they would be entitled to, on the assumption I have made, they would be entitled to £3750 profit, which, at 25 years purchase, would give £93,750, and taking it at one year less it would be £90,000.

Sir E. BECKETT: But you are giving them the benefit of more than 25 years purchase on their present profits, are you not?

Witness: No. I find from the way my calculations are made that they would be entitled now to 10 per cent. on £24,000, which we may call £2400 per year, and 5 per cent. on £27,000 which I say, having regard to the calculation I have made, they would be entitled to; those make together £3750.

Sir E. BECKETT: Now what do you say about their charges for laying on the gas-service pipes, meters, and so on?

Witness: From what I can gather, that is a charge which is entirely different from anything I ever knew, and it is more than any other company charge. It is well known that, under the Act of 1871, any company are compelled to put in a service-pipe free of charge; but, practically, that system obtained long before 1871, because in very many Acts there was generally a clause put in, that companies should furnish service-pipes free of charge, but in this case they have always charged for service-pipes at a very high rate. I have seen a charge which they made for service-pipes; it was at the rate of 6d. per foot, and they charge, in addition to that, the labour for the men who put it in. I have a bill here, from which I find that a 3-light meter is charged at the rate of 6s. per year, and I say distinctly that is about double the rate charged by most other companies. The price of a 3-light meter is 27s., and as they ask the consumer to pay 6s. per year for it, and to pay in advance directly the meter is put in, in four years it will be paid for absolutely and something left. A meter will last for 10, 12, or 14 years. It will generally last five years without any repair at all. I know of no case in which companies charge their consumers for laying pipes; they simply lay the service-pipe up to the meter, supposing it does not exceed 30 or 40 feet. Taking all these charges together, it amounts in the whole to a very large sum, which makes an addition to their profits. I cannot say exactly what sum it would make, because it depends on the length of the service-pipes, but the effect of it is to prevent consumption of gas, especially in the case of comparatively poor people.

Cross-examined by Mr. MICHAEL: I generally find that there is some sort of complaint or other made about gas companies. The Rotherham gas case was on all fours with the present, to the extent that the local authority were desirous of acquiring the gas-works; there was a great fight, and the company eventually agreed to sell their works when they saw there was a probability of their being taken from them.

Mr. MICHAEL: But with respect to the 25 years purchase of the revenue derivable from the company you speak of, that was a company limited with an absolute dividend, and, therefore, differing from the one we are now considering. What is the amount of profit which the Ramsgate Company are likely to earn?

Witness: That is a question which will never be known until we come out of this committee-room. At present they are only entitled to pay a dividend upon £24,000.

Mr. MICHAEL: But if they like they might divide £8000.

Witness: I know they might, but they would have to do it in the teeth of public remonstrance.

Mr. MICHAEL: As far as law is concerned, there is nothing to prevent them dividing the £8000 if they could earn it?

Witness: They could; but there are some things stronger than law.

Mr. MICHAEL: I am glad to hear you say so, but we are not here to consider the moral aspects of the case. You are now taking 25 years purchase to be multiplied into a suppositious sum?

Witness: I have given my reasons for so doing, and I will assume that this company have got some legal obligations, one of which is to come to Parliament for powers to raise fresh capital when they have exhausted the powers they have already received from Parliament.

Mr. MICHAEL: In the future, supposing the company had obtained an Act of Parliament, that will all depend upon the amount which they are to have upon their capitalized profits, and also upon the amount of the profits which are to be capitalized in future?

Witness: Yes, and I have ventured to put before the committee an estimate of what I think they could get if they consistently adhered to their parliamentary authority. They could only get a sum equal to £27,000 of the money which they saved; that is all they fairly could have asked to be capitalized.

Mr. MICHAEL: Have you any doubt that that amount of money which is here called capitalized profits has been expended upon the works?

Witness: No, I have not assumed any doubt at all. I took what they asked for—£48,000 only—I dealt with it in a certain way, and I say that, having regard to what they should have done, they could not have made that £48,000 in the time, giving them also the opportunity of paying to their shareholders the full dividends which Parliament would have granted them.

Mr. MICHAEL: If they had come to Parliament it would have been necessary to raise the amount of capital at either 10, 7½, or whatever per centage Parliament might have given them; and, whatever they would have earned under those circumstances would in your opinion be worth 25 years purchase?

Witness: Yes, that is exactly my calculation of what they would have earned under parliamentary powers. If they had raised a capital under parliamentary powers, they would have made a profit less by £21,000 than they have done by the rate they have charged for gas, and by these little excesses which they have made—such as the charges for meters, service-pipes, and so on.

Mr. MICHAEL: What are the advantages which you believe will accrue to the consumers of gas in Ramsgate from a transfer of the works from the company to the local board?

Witness: Supposing the company employ a proper manager, and conduct their affairs in a proper way, I cannot see that there are any advantages except a money advantage, which will be simply that, for any future capital, the local board or the authority will be able to raise the money at a less rate than the gas company would. I am not here for a moment to say that the local board ought to acquire this undertakiug except at a fair price.

Mr. MICHAEL: Is there any other advantage except the possibility of their borrowing money at a less rate?

Witness: I think not, supposing the conditions are carried out which I have just stated—that is, that the concern is carried on in a proper manner, and to the best advantage. It has not been up to this time, and that is the reason we are here.

Mr. MICHAEL: That is a matter for the committee to decide. Do you consider, in an undertaking of this kind, there is any element of prospective value?

Witness: I dare say there is, but I do not think it has been taken into consideration in dealing with these matters by arbitration.

Mr. MICHAEL: Is the 25 years purchase to include, in your opinion, any prospective advantage which the company might derive from the future conduct of the undertaking?

Witness: As far as my experience goes, and it is not small in dealing with these matters, in transfers of undertakings like these from one body to the other, it has always been distinctly assumed that the future is for the purchaser, and I think I may say at once I hold that view too.

Re-examined by Sir E. BECKETT: I know that the local authorities of the small town of Horncastle were able to borrow money to pay for the purchase of the gas-works at 4 per cent., and, therefore, in Ramsgate the town will get the benefit of the difference between 4 and 7 per cent., which the company propose to take on their new capital. In what I have stated, I have endeavoured to deal fairly with the company, so that they could not complain and say I have done something I ought not. I do not think they have any right to take credit for what would have been their condition in Parliament when they have chosen to stay away from Parliament.

TUESDAY, MARCH 20.

Mr. *Penny* recalled, and further examined by Mr. BIDDER.

Under the provisions of the Bradford Corporation Gas Act, 1871, the corporation acquired the undertaking of the Bradford Gas Company for the sum of £210,000, the company having asked for the same £325,000. The amount of capital actually paid up was £55,000, and a further sum of £8707 had been received as premiums on shares sold by auction. The company had expended on their undertaking, in addition to these sums, £162,856 out of profits, making in all an actual expenditure of £226,562; so that the amount paid by the corporation was £16,563 less than the company had expended. The Rochester Gas Company applied to Parliament in 1867 for further powers to raise capital, and for liberty to capitalize undivided profits, expended on their undertaking, amounting to £84,000; but Parliament only allowed them to capitalize £28,000, on which they gave them 10 per cent., and 10 per cent. upon their original capital of £14,000. The rate allowed for new capital was 7 per cent. Their original Act was passed in 1825; and their next application was in 1867, when they were threatened with a rival company.

Mr. *B. Latham*, examined by Mr. BIDDER.

I am a member of the Institution of Civil Engineers, and have given a great deal of attention to the subjects of water supply and sanitary engineering. I have been to Ramsgate in connexion with the subject of the water supply. It is hardly necessary to form an opinion about Southwood as a place from which to draw water, seeing that the company virtually abandoned those works by the substitution of the Whitehall works many years ago, when they found that, with the exhaustive pumping, they began to pump sea water. I understand that water is drawn from Southwood from time to time for the supply of the houses in the town. I do not know it of my own knowledge; but I cannot understand why machinery should be kept there, if it is not intended to be used. There is no doubt that, with regard to Whitehall, the works are much better situated; but even there, the valley beyond is getting to be densely populated, and sooner or later there will be great liability of pollution, even at that site. The Whitehall works will never supply the quantity of water absolutely necessary for a town like Ramsgate, because the total drainage area at the Whitehall works, at the present time, does not exceed 2½ square miles, and, since the formation of these works, others have been established, in the same area, at Broadstairs.

Mr. BIDDER: In your judgment, for the requirements of the town to be properly met, ought an entirely distinct and independent site to be sought elsewhere, in addition to the Whitehall site?

Witness: From my experience, and judging of the quantity of water flowing off the chalk area, we have to deal with the minimum quantity—that is to say, the quantity varies very much. As a rule, it is largest in the early summer, and least in the autumn and winter months. I have never been able to find that more than 300,000 gallons of water have ever flowed off a square mile of chalk, at the minimum period, in 24 hours, and that is taking a year of more than average rainfall. A certain amount of water is absolutely necessary for the fixed population, which, with a constant supply, may be put down at 25 gallons a head, and if the fixed population in Ramsgate and St. Lawrence is taken at 20,000, that would equal half a million gallons a day. But to that must be added the extra quantity required for visitors. I have had some experience with regard to seaside places, and visitors do not consume water in the same ratio as the fixed population do, and therefore a much smaller quantity per head would be necessary for them, which may be put down at 10 gallons per head. If the number of visitors is 40,000, and the resident population is 20,000, it would therefore require a diurnal supply of 900,000 gallons. I have always advocated that water-works should be in the hands of the sanitary authorities. Water is really the great sanitary agent, and should be in the hands of the local authority, but the interests of the sanitary authority and of the water-works company are diametrically opposite. The latter endeavour to conduct their operations at the least possible cost, and to supply the least possible quantity of water; on the other hand, the stint of the water supply is detrimental to the sanitary welfare of the district. Under the provisions of an Act of Parliament, a sanitary authority can now borrow money for sanitary purposes, water-works included, at 3½ per cent., from the Public Works Loan Board, to be repaid in 30 years; but supposing the same capital is raised by the company, it depends upon the dividend which Parliament sees fit to give them. In the present case, the local authority have, with the assent of the body who control such things, a period of 85 years allowed for the redemption of the expenditure, and that, of course, will lessen the burden on the consumers. There is necessarily a limitation to constant supply; there are certain repairs at times to a limited extent. It is customary to supply on the constant system sufficient water, not only to carry it to the tops of the houses, but sufficient for a jet at the top of the house, as a precaution against fire. The level at Ramsgate is such that the water could never be used for fire purposes, even with a constant supply, as it is only a very few feet above the levels of many parts of the district.

Cross-examined by Mr. MICHAEL: I believe the supply at Norwich is about 16 or 17 gallons per head. At Manchester it is 17 or 18.

Mr. MICHAEL: If in such large places from 15 to 18 gallons are sufficient, why have you put down 25 for Ramsgate?

Witness: That quantity is for domestic supply and other purposes. If you take the total, you will find that at Manchester and other places it comes to considerably more.

Mr. MICHAEL: Then if I give evidence that it is less, of course, your calculation will be wrong?

Witness; With regard to Manchester it would be; but I have myself made a very large number of experiments, by metering a number of cases upon the different fittings, and I am ready to admit that, so far as domestic consumption is concerned, it can be brought down to 14 gallons per head. I do not know how much is used for flushing the sewers in Ramsgate. I hear that the company charge 15s. per 1000 gallons, and that is such a price that the local board cannot afford to use it in large quantities.

By the COMMITTEE: With regard to the chalk formation, the rainfall is no criterion whatever as to the amount of water which may be yielded. For example, during the last six weeks not one drop of water which has fallen has affected the springs in the slightest degree in the large area of the chalk formation, but during the whole period the springs have been rapidly falling; and for a very large period in every year the springs receive no accession to their rainfall. It is only for a very limited period in the autumn, in the chalk districts, that the springs receive any accession of water.

The COMMITTEE: Does it not often happen that the water supply over a given area is very much disturbed, either by the water running from that drainage into an adjoining area, or *vice versâ?*

Witness: That is not so with regard to the chalk formation; the water, as a rule, follows the valley lines. There is a very large area of water which can be obtained beyond the limits of the Whitehall source. Under the provisions of the Public Health Act, sanitary authorities can go beyond their districts for a supply.

Mr. BONHAM-CARTER: I suppose that the rainfall ultimately affects the springs in the chalk formation?

Witness: Yes; especially the portion of the rain which falls at the back end. For instance, the last season was a very wet one, and the supply of water to the springs was most exceptional, so that we have now several burns running out of the chalk formation. A burn in the neighbourhood of Croydon has reached as much as 21 million gallons in a day, within a month of the present time, while the largest quantity in that same drainage area was under 2½ million gallons in the middle of last November. An estimate of the yield of water from a chalk formation can only be obtained by absolute measurement.

Mr. *J. Mansergh*, examined by Mr. O'HARA.

I am a civil engineer, and have had considerable experience in designing and constructing water-works. I went down to Ramsgate, but was refused permission to inspect the water-works. The Southwood works ought, in my opinion, to be entirely abandoned, because it was given in evidence by the engineer of the company that the water was impregnated with sea water, and was probably polluted by infiltration. If I were designing works for Ramsgate, I should provide for 20 gallons per head of the whole population, both normal and visiting. I think the company ought not to have called upon the consumers to keep cisterns for the supply of water, but ought to have given a constant supply, as was intended by their Act of 1835. It has involved an expense of about £5 10s., whereas with a constant supply 45s. would have been sufficient. In my opinion, the district has been very badly treated, and it is time for the company to be improved off the face of the earth. If the works were transferred to the local board, the town surveyor would naturally, in a place like Ramsgate, be the manager of the water-works. He would have the supervision of the fittings from the main to the closet, and from the closet to the sewer; the whole thing would be under him, and he would be responsible. If there is any division of supervision of this kind, the defects which have been spoken of must arise.

Cross-examined by Mr. POPE: I do not think the company ought to have any credit for the steps they are now taking to obtain a further supply, because they are only doing it under pressure.

Mr. *T. Knox*, examined by Mr. O'HARA.

I am an engineer and ironfounder, and also lessee of the Clarence Baths, at Ramsgate. I know the water-works at Southwood and Whitehall, and have been to the bottom of the wells in both places. At Whitehall the engines pump about 330 gallons per minute, and at Southwood about 275 gallons. At Whitehall the pumps are not used more than about ten hours a day, and the Southwood works are only used when the water at Whitehall is low. The water at Southwood is as salt as brine; I have tasted it. When I have used the water in my boilers it has caused them to prime, and as a rule it destroys the plates very much, and corrodes the cocks and fittings. I think if the local board do not have the water-works in their own hands, the sewerage system will break down.

Cross-examined by Mr. LEIGH: I first tasted the water about 20 years ago, when they took the spring, but I have frequently tasted it since.

Mr. *A. Knight*, examined by Mr. O'HARA.

I have resided at Margate for nearly 20 years, am an alderman of the borough, and have been for eight years a member of the Town Council. There has been very great dissatisfaction with respect to the quantity and quality of the gas supplied ever since I have taken an active part in public affairs in Margate. In November, 1874, a Bill was contemplated for the formation of an opposition company for the better supply of the town, and to endeavour to obtain possession of the present works, so far as Margate was concerned. That Bill was read a first time in the House of Commons; but in consequence of the sudden death of the two other gentlemen, whose names were inserted in the Bill, in conjunction with myself, as promoters, the measure was dropped. I cannot say that since that time the dissatisfaction with the gas at Margate has increased, but there has always been a dissatisfaction with regard to the price and as to the supply to the public lamps. I was at one time deputed by the Margate Corporation to wait upon the directors of the gas company, in order to try and obtain a better supply for the public lamps. We were received with courtesy, as we always were, but we came away pretty much as wise as we went; we obtained no redress to the complaints we made. At one of the interviews we were told that the public lamps were supplied without any profit, and the company declined to reduce the price in consequence of that. The only thing the corporation could do to lessen the price of the town lamps was to reduce the number of the hours of burning, and that, of course, created great dissatisfaction in the town. In the interest of Margate, it is, in my opinion, desirable that the Bill of the Ramsgate Local Board should pass. Our opposition to the Bill is simply to settle the terms upon which we are to be dealt with. In a sanitary point of view I consider we ought to obtain possession of the works, in order eventually to have them removed, because they are being surrounded with houses. [Witness was examined at some length as to the various meetings of the Town Council, which had been held on the subject of the gas supply, at one of which it was resolved, in consequence of being too late to enter an opposition in the House of Commons, to oppose the Bill of the Isle of Thanet Gas Company in the House of Lords, should it reach that House.]

Cross-examined by Mr. LEIGH: There was a meeting of the ratepayers under the Borough Funds Act, at which it was resolved to support the Town Council. I never heard of a subscription being raised in Margate for the purpose of opposing the gas company's Bill. The last time I took part in a deputation to the gas company was about three years ago. The complaint was as to the price for the public lamps. I cannot say what the price was at that time. I know we once paid £4 10s. per lamp. We never paid a price per 1000 feet.

Mr. LEIGH: Was it at that time that the price of gas was 5s. per 1000 feet?

Witness: It was 5s. at one time.

Mr. LEIGH: It was 4s. 6d. and 4s. at other times, was it not?

Witness: Quite right.

Mr. LEIGH: When the price was 5s., was not that the time when the price of coals was so high?

Witness: Yes; I think it was when they raised their price. Since then the price has been 4s. to the consumers.

Mr. LEIGH: You say that to the consumers the price has been 4s., but it would not be so much to the public lamps?

Witness: It ought not to be, but in my opinion it is.

Mr. LEIGH: You say it is £4 10s.?

Witness: I will not be sure of the price, but you can be told.

Mr. LEIGH: If I tell you it is 10 per cent. less than the minimum price of 43s., what would you say to that?

Witness: I should very much doubt it. I do not come here to give evidence upon these points, but upon the general question.

Mr. LEIGH: You come here to complain of the gas, and when I try to test your evidence as to the public lamps, all you say is that you are not prepared to give evidence on that subject.

Witness: Yes; on that point.

Mr. *B. Twyman*, examined by Mr. O'HARA.

I am an estate agent, in High Street, Ramsgate. I find the gas corrodes the pipes, and causes us to have them cleaned every three or four months, which process costs from 6s. to 8s. each time. There is a general feeling in the town in favour of the transfer, those against it being more or less interested in the company. I canvassed about 200 people, and found at least four-fifths in favour of the transfer.

Cross-examined by Mr. POPE: The inhabitants wanted the benefits of better light, better attention, and certainly better financial administration. By "financial administration" I mean that we should not have to pay interest on the profits which have already accrued.

Re-examined by Mr. O'HARA: My objection is that they take the money which ought to have been given to us, by reducing the price of gas, and then charging interest upon it.

Mr. *E. B. Bloxam*, examined by Mr. O'HARA.

I am a grocer, residing in Cecil Square, Margate. I have been a consumer of gas for 15 or 16 years. My opinion is decidedly in favour of the Margate Corporation obtaining the Margate works. I had occasion, two years ago, to complain to a director of the gas company, and the remedy suggested was that I should appeal to the board at Ramsgate, which was a great inconvenience, as it involved a journey and loss of time, without any recompense. In 1874 the company lowered their price, but that seemed an anomaly, for in reality I paid as much as before.

Cross-examined by Mr. POPE: The last complaint I made was some few years back, but I have become tired of making them. I should think there have been from four to six meetings on the subject during the past 12 months.

Mr. *W. Perry*, examined by Mr. O'HARA.

I have lived in Margate for about 30 years, and remember the meetings held to protest against the conduct of the gas company. On one occasion, when the company thought the burgesses had determined to form a consumers company, they sent a message to the meeting, that if they would forego that intention they would reduce the price and improve the quality, and upon the faith of that promise the project was dropped. Mr. Bentley was one of the chief agitators upon that occasion, but he subsequently joined the board of the gas company.

Cross-examined by Mr. POPE: When we waited upon the directors in 1874, the chairman told us they had reduced the price without any pressure from without, but that was not the case—the pressure had come from without.

Mr. *R. Dewhurst*, examined by Mr. O'HARA.

I am an ironmonger and gas-fitter in Cumberland Road, Margate, and a member of the Gas Committee appointed by the ratepayers. In my opinion the gas supplied has been very impure.

Mr. O'HARA: Have you had any experience of the gas in your own house?

Witness: I saw the gas escape in broad daylight. The first thing that called my attention to it was a smell like that of a cesspool.

Mr. O'HARA: Do you mean that the gas smelt like a cesspool?

Witness: Yes; it was very offensive, and I traced the smell to the gas-meter?

Mr. O'HARA: Did you discover a leak in the pipe leading to the meter?

Witness: I saw it escape.

Mr. O'HARA: The gas came out of the pipe in such an impure state that you actually saw it?

Witness: Yes.

Mr. O'HARA: You actually saw the gas coming out of the pipe, and the smell was very offensive?

Witness: Very, indeed.

Mr. O'HARA: Did you proceed to stop the leak?

Witness: I sent my man to do it.

Mr. O'HARA: Did you conceive the gas you saw coming out of the pipe, and that smelt so bad, to be very impure?

Witness: Very impure.

Mr. POPE: I cannot venture to cross-examine a man whose vision is so strong.

By the COMMITTEE: It was an escape from the meter, and I had two witnesses there to prove it. We saw it escape, like a sort of yellow smoke.

Mr. *R. Read*, examined by Mr. O'HARA.

I am instructor to the Volunteer Corps, but my experience of gas was derived as steward of the Civil and Military Club, which office I held for rather more than two years. I suppose we had the best burners and proper fittings at the club, as they were supplied by a director of the gas company. We repeatedly found the gas bad in quality, and offensive in smell. The light has sometimes been so bad that we have had to light candles, and on two or three occasions it went out altogether. The defective pressure was very clearly proved. We had 45 burners, and after lighting about half a dozen we found the light diminished.

Cross-examined by Mr. POPE: It did not occur to me that the service-pipe was not big enough, but it did to the gas company, who sent and had it enlarged, to meet the difficulty, and the supply was improved, no doubt. There were sooty particles in the gas, and it was a very dirty light, not a pure white light.

Mr. O'HARA said that was the case for the promoters.

Mr. BALFOUR BROWNE, in addressing the committee on behalf of the ratepayers of St. Lawrence who had petitioned against the Local Board Bill, said that his clients, while desirous of seeing the companies put under parliamentary control, and rendered amenable to the General Acts, believed that they would get a better supply of gas and water from the companies than from the local board. He commented upon the trivial nature of the complaints which had been made against the company, and said that hundreds of persons could always be found to make such complaints. The whole matter was brought before a committee of the House of Commons last year, when the case was substantially the same, and, after hearing all the complaints, the committee rejected the Bill of the local board. He had elicited from many of the witnesses that at the present time there was little or nothing to complain of with regard to the gas and water supply. It appeared to him that the case was in every way weaker than last year. While the local board were there in spite of a parliamentary snub, the companies were present in obedience to the suggestion the committee threw out when they rejected the Bill of the local board last year. The case of Stockton and Middlesbrough, in which a compulsory sale had been enforced, was not similar to that of Ramsgate, for, in the former case the companies neglected to obey the suggestion of the committee. The reverse was the case in the present instance, and, instead of being asked to confirm the decision of the committee of last year, they were asked to stultify that decision. With respect to the question as to whether the transfer would be to the advantage of the outlying district of St. Lawrence, his clients felt that they would be safer in the hands of the companies than of the local board. The price to be paid for the works would be necessarily large; the local board would be overburdened; the price charged for gas and water must be very high; and, even if there were large profits, St. Lawrence would not receive the full benefit of them, as one-half would go to the Ramsgate District Fund. The case of Manchester was not analogous to that of Ramsgate and St. Lawrence, because Manchester was a large centre, and could supply gas to the outlying districts with advantage; but if the principle was to be extended to places like Ramsgate, why should not every little local board around Manchester have its own gas-works? The outlying districts round Manchester were charged considerably more for gas and water than those within the city, and there was nothing in the Bill of the Ramsgate Local Board to prevent them from adopting the same practice towards St. Lawrence. The Rev. Mr. Banks had given evidence in favour of Ramsgate incorporating St. Lawrence; but, if such a thing were proposed, he believed it would be most strenuously opposed by the St. Lawrence people. Mr. Banks had admitted that he thought the transfer would enrich the town of Ramsgate, but this would not be fair towards St. Lawrence. If the Bills of the companies were passed, they would still have the local board to look after them; but if the local board's Bill passed, there would be no supervision, as ratepayers were not allowed to appear in opposition to a local board. If corporations and the local boards were the proper persons to manage the gas and water supply, why should they not extend the principle? Mr. Chamberlain, of Birmingham, had already proposed to extend it to public-houses, and possibly they might soon have the Corporation of London become importers of American beef. In conclusion, the learned counsel said he had several witnesses from St. Lawrence, but he did not propose to call them at that time, but to put questions to them when they were examined as witnesses for the companies.

Sir E. BECKETT objected to this course, and, as the witnesses were not then in attendance,

Mr. BROWNE said he must forego their evidence, and satisfy himself with what he had elicited in cross-examination of the local board's witnesses.

(To be continued.)

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

WEDNESDAY, APRIL 11.

(*Before Vice-Chancellor* MALINS.)

GLOSSOP *v.* THE ISLEWORTH LOCAL BOARD.

Mr. GLASSE, Q.C., appeared in this case, in which the plaintiff, the owner of a house and grounds in the neighbourhood, complains of a nuisance committed by the defendants in their sewage operations, whereby the health of himself and family is injuriously affected. The learned counsel complained that whenever the question came before the local authorities, some member moved its adjournment, and so the plaintiff had to sustain continued injury. The plaintiff, however, had no wish to act harshly towards the defendants, if they would give an undertaking to proceed with despatch.

Mr. HIGGINS, who represented the defendants, denied that any nuisance existed, and said some people thought the Thames a nuisance.

The VICE-CHANCELLOR considered the defendants own acts and correspondence proved there was a nuisance, and he would grant an early day, upon which, the motion being treated as the hearing of the cause, it should be disposed of. The motion, therefore, would stand over for a fortnight.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

QUARTERLY REPORT OF THE CHIEF GAS EXAMINER.

The following is an abstract of the report of Professor Williamson, the Chief Gas Examiner to the Metropolitan Board of Works, on the results of the daily testings of the gas supplied by The Gaslight and Coke Company, and the South Metropolitan Gas Company, during the quarter which ended on the 31st of March, 1877:—

Illuminating Power in Standard Sperm Candles.

	Max.		Min.		Aver.
The Gaslight and Coke Company—					
Common gas, Beckton	19·1	...	15·9	...	17·5
,, Ladbroke Grove	17·8	...	15·2	...	16·8
Cannel gas, Millbank Street	23·4	...	20·0	...	20·7
Common gas, Devon's Road	18·3	...	16·1	...	17·0
,, Carlyle Square	19·0	...	16·3	...	17·5
,, Camden Street	17·5	...	15·9	...	16·6
,, Graham Road	19·9	...	15·8	...	17·8
South Metropolitan Gas Company—					
Common gas, Hill Street	19·8	...	14·6	...	17·2

The average illuminating power of the gas from each station has been above the requirements of the Acts of Parliament, and, in some cases, such as at Camden Street and Graham Road, considerably above those requirements. On the other hand, the gas has, on very rare occasions, been below the required illuminating power, but even then very slightly so.

A temporary diminution of illuminating power down to 14·6 in the gas supplied by the South Metropolitan Company was observed on one occasion. This was due to air having been accidentally drawn into the gas, which, however, even under these circumstances, was slightly above the required illuminating power.

The gas made at the various stations has been uniformly free from sulphuretted hydrogen except on one occasion, in which the gas at Hill Street was found to contain some of that impurity.

Proportions of Sulphur, in other Forms than Sulphuretted Hydrogen, in Grains per 100 Cubic Feet of Gas.

	Max.		Min.		Aver.
The Gaslight and Coke Company—					
Common gas, Beckton	21·1	...	8·4	...	13·1
,, Ladbroke Grove	19·5	...	11·3	...	14·2
Cannel gas, Millbank Street	18·9	...	8·6	...	13·6
Common gas, Devon's Road	19·97	...	9·8	...	16·0
,, Carlyle Square	21·5	...	7·2	...	13·4
,, Camden Street	23·1	...	12·1	...	17·1
,, Graham Road	22·5	...	9·5	...	14·6
South Metropolitan Gas Company—					
Common gas, Hill Street	42·6	...	8·8	...	18·0

The greatest amount of sulphur found at every station except two has been within the requirements of the Acts, whilst the average quantity found at each station has been considerably lower than those requirements. The two stations at which an excess of sulphur was found are Beckton and Hill Street. The excess at Beckton was very slight—viz., 1·1 grain per 100 cubic feet. The excessive quantity of sulphur found at Hill Street was due to a temporary defective action of the purifiers.

Ammonia has been uniformly absent at Ladbroke Grove, and almost so at Devon's Road and Graham Road. It has been rarely present at Millbank Street. At Beckton and Camden Street it has been present in small and tolerably regular quantities. At Hill Street there have been great irregularities in the amount. At Carlyle Square the quantity of ammonia present, though always small, has fluctuated considerably.

Dr. Stevenson's report on the gas supplied by The Gaslight and Coke Company to the Vestry of St. Pancras, during the month of March:—Maximum light, estimated by sperm candles, according to the Act—19·5. Minimum light, sperm candles—16·1. Average light, sperm candles—16·9. Traces of ammonia, indicated by turmeric test-paper—Traces only, on all occasions. Traces of sulphuretted hydrogen, indicated by lead test-paper—none at any time. Sulphur, 18·1 grains per 100 cubic feet.

PURCHASE OF THE LEICESTER GAS-WORKS BY THE CORPORATION.

A Special Meeting of the Leicester Town Council was held on Monday, the 10th inst.—the Mayor (Alderman Winterton) in the chair—to consider a report from the Parliamentary Committee in reference to the opposition of the Bill of the gas company now before Parliament.

The proceedings commenced by reading the report of the committee, which stated that, under the authority conferred upon them by the council, they had retained the services of Mr. Bramwell, C.E., and Major Tulloch, R.E., to assist in the opposition of the company's Bill. Both gentlemen had visited Leicester, and inspected the present works of the company, and the proposed new site. Other witnesses also had been engaged. The report then proceeded as follows:—

The committee are, however, glad to be able to report that circumstances have transpired which, in all probability, will bring the opposition to a termination, the works having been put in price to the corporation.

The following is a brief outline of the negotiations which have taken place—viz., Mr. Grimsley having had an intimation that the representatives of the company were prepared to discuss terms on which to assign over to the corporation their works and undertakings, he had interviews with Mr. Billson, the solicitor and secretary to the company, and ultimately, with the full concurrence of the mayor, the following proposition was submitted by him for the consideration of the directors—namely, that the corporation should, in respect of the C shares, which are now paying a dividend of 14s. per share, being the maximum amount authorized by Parliament to be paid, guarantee a payment of 16s. per share perpetual annuities, redeemable by the corporation at six months notice whenever they think fit so to do, at 25 years purchase; and also to guarantee annuities for the remainder of the shares (A and B) at a corresponding addition of one-seventh of their statutory dividends, and in other respects on the same conditions.

It having been ascertained that a settlement might be arranged on the above basis, the committee met, and the matter was fully and carefully discussed and considered, and with perfect unanimity it was decided to enter into a preliminary agreement for the purchase of the undertaking, and to recommend the council to give effect to the arrangement.

The following is a copy of a memorandum which was prepared and has been signed by Mr. Billson, on behalf of the shareholders, and by the mayor, the chairman of the committee (Alderman Stafford), and the chairman of the Highway and Sewerage Committee (Mr. Grimsley) on behalf of the council.

The committee recommend the council to ratify the course which they have pursued, and to authorize a detailed agreement to be prepared and settled under their direction, and to give authority to the town-clerk to affix the common corporate seal of the borough thereto.

It will be observed, from the memorandum, that the opposition of the corporation to the Bill now before Parliament is to be withdrawn, but this and some other matters of detail will be more fully explained by the gentlemen who have conducted the negotiations.

Heads of Agreement between the Corporation of Leicester and the Leicester Gas Company.

1. The corporation to purchase and take over the undertaking of the company, with the exceptions afterwards mentioned.
2. The consideration to be paid to be the perpetual annuities hereafter stated—viz.,
   In respect of each C share . . . . . 16s. 0d. per annum.
   In respect of each B ,, ... 17 1 5-7 ,,
   In respect of each A ,, ... 26 3 3-7 ,,
   such annuities to be from time to time redeemable at the option of the corporation, on giving six months notice, and on payment of 25 years purchase for the same.
3. The annuities to be charged upon the gas undertaking of the corporation and upon the borough rates, or in such other way as may be agreed upon.
4. The undertaking to be taken over on June 30, 1878, upon which day the annuities are to commence and to be payable half yearly, on the 1st day of January and the 1st day of July in each year, the first payment being due on Jan. 1, 1879.
5. Until the actual transfer to and taking over by the corporation, the company to carry on their business and make all payments as fully as hitherto, and to make such extensions as may be necessary, and to act in the management of their business for the benefit of their undertaking, as if no agreement had been entered into, but they were carrying it on for the benefit of their shareholders.
6. The company to retain out of their general assets the amount of all unclaimed dividends for which warrants shall have been issued, and also to retain and to distribute amongst the shareholders the half-yearly dividends on their shares in respect of the half year ending on June 30, 1878, and further, to retain a sum of £4000 for payment of all expenses to be incurred after the actual taking over by the corporation, and of the winding-up of the company, any balance thereof being appropriated to such purposes as the company shall think fit.
7. The corporation and the company to apply for a joint Act of Parliament in the next session, to carry out the arrangement, and in the event of such Act not being passed in the next session, or failing that in the next following session, this agreement, unless otherwise mutually agreed upon, to be void. The joint Bill to be settled, in case of disagreement on any point, by some counsel to be selected by the Board of Trade.
8. The company to proceed to obtain their present Bill, the opposition to which by the corporation shall be withdrawn, but such Bill, and all powers to be thereby obtained, to be transferred with the undertaking to the corporation. The company not to issue any further share capital until the result of the application for the joint Bill is ascertained. If more money shall be required by the company than their present borrowing powers shall suffice to supply, the company may borrow from their bankers or other persons, on the best marketable terms, in lieu of issuing shares, and such loans shall be taken to by the corporation as part of the obligations of the company.
9. The clerks and servants of the company whom the corporation may decide to retain in their service to be considered, with respect to any superannuation funds or other benefits, as having been in the employ of the corporation during the whole time—*i.e.*, their services with the company and the corporation to count as continuous.
10. The corporation to take all the debts, liabilities, and obligations of the company existing at the time of taking over, and hold the company harmless therefrom, and to issue, on such taking over, to each shareholder, certificates of the annuities in a form to be provided by the joint Act.

The report was signed by

Wm. Winterton, Mayor, subject to the approval of the Council of the Borough of Leicester.
W. Billson, jun., Secretary, subject to the approval of the Shareholders of the Company.
John Stafford, Chairman of the Parliamentary Committee.
William Grimsley, Chairman of the Highway Committee.

Dated April 5, 1877.

Alderman Stafford, moved—"That the report of the Parliamentary Committee be adopted, and that the committee be authorized, on the advice of their solicitors or counsel, to settle the terms of an agreement to carry out the recommendation of the committee for the corporation to acquire, with the sanction of Parliament, the works and property of the Leicester Gas Company, and that the town-clerk be authorized to affix the corporate common seal to such documents as may be necessary to give effect to the arrangement." He said: Perhaps this may be considered one of the most important meetings ever held of our Town Council, as it involves a question of great magnitude to the inhabitants generally. Next to water, gas stands out as one of the great conveniences of life. At our last meeting you were called upon to sanction an opposition to the Leicester Gas Company's Bill now pending in the committee of the House of Commons, and I do not in the least regret the stand we took to protect our interests, as it may have been the means to the end at which we have arrived to-day. It appeared to the Parliamentary Committee that an extension of the gas-works, requiring the creation of a capital of £250,000, was altogether beyond the requirements of the town for very many years to come, and that the main object of the Bill could only be to utilize the surplus profits. We, as the custodians of the interests of the town, while sensible of the sagacity of the directors, felt it our duty to oppose this step. All our preliminary arrangements were completed, and we had secured the assistance, as authorized by you, of counsel and engineers, when a change came o'er the scene. Mr. Grimsley learned (notwithstanding the letter he had received from the company that they were not disposed to part with their works) that it was possible some amicable arrangement might be arrived at. This intimation led to talking over terms in strict confidence. At this stage Mr. Grimsley felt bound to consult the mayor and myself, as chairman of the Parliamentary Committee, on the subject; the terms appeared to us satisfactory to both sellers and buyers, and we then summoned a meeting of our committee, and laid the whole thing before them, when they unanimously approved of the offer. As we had to give an answer that day, we had no opportunity of reporting to the council what had been done, but accepted the terms subject to your approval and the approval of the shareholders of the company. One matter which led to the necessity of our immediate answer was, doubtless, the fact that a notice of motion was to come on in the House of Commons by Mr. Raikes, Chairman of Committees, to the effect that in any Bill by which an existing gas company is authorized to raise additional capital, provision shall be made for the offer of such capital by public auction, or tender, at the best price which can be obtained. It will be seen at once that, if carried out, this would have considerably affected the object of the proposed Bill. Doubtless this has led in some measure to our more easy settlement of this question, and the satisfactory terms we have been enabled to make on behalf of the corporation. Our thanks are due to Mr. Grimsley for the action he has taken, through which we have arrived at this peaceable solution of the difficulty. He shall tell his own tale in detail in seconding this resolution; suffice it for me to speak of the matter generally. Last year the profits of the company amounted to little short of £28,000, while our arrangements are to pay in perpetual annuities the sum of £19,000, which leaves a margin of £9000. Thus, without any money being required to be found to carry out this arrangement, and as the Leicester Gas Company have been a rapidly improving one, there is no reason to doubt that the future will yield even a larger surplus than the past. There is also a handsome reserve-fund of £22,394, and also a gasholder reserve-fund of £7000, together nearly £30,000, to fall back upon for contingencies, while Mr. Bramwell, the engineer whom we had secured to advise us in this matter, says the works are in a splendid condition of efficiency, as might have been expected from a company having really more money than they knew what to do with. It is quite possible that the corporation may be called upon to reduce some part of the liability and pay off their annuities; but this may be done by spreading it over 75 or possibly more years, and thus be made perfectly easy to accomplish. On the whole, I think, while the shareholders of the company on the one side have reason to congratulate themselves that they will receive an increased dividend, we, the corporation, shall possess a valuable property which is certain to produce a handsome profit over and above the annuities and sinking-fund we may have to pay, and this will, of course, go to reduce the rates. I cannot too warmly express the satisfaction I feel at the amicable termination of this business, which stands out in such favourable contrast to the recent water-works Bill. The directors of the gas company have behaved throughout in the most handsome and courteous way, and as we have several of them members of our council, we may hope for their co-operation in the future carrying on of the works on our behalf.

Mr. Grimsley, in seconding the motion, said that he thought the opposition of the corporation to the company's Bill, and the proposed new Standing Order of the House of Commons relating to the disposal of new shares by auction, had been important elements in bringing about the arrangement which had been provisionally agreed to, and had tended very materially to induce the directors to listen to any fair proposal for the purchase of their undertaking. Meeting with Mr. Billson, the solicitor and secretary of the company, he stated to that gentleman that, if he was prepared to go into the question of purchase, he would discuss the matter with him, and Mr. Billson replied that it was not altogether impossible, and that if the corporation were prepared to offer what the directors and shareholders might consider to be fair terms, he believed that there might be a purchase of the undertaking. He (Mr. Grimsley) feeling the responsibility of his position, consulted with the mayor, and, after thoroughly going into the matter, they agreed that it would be well to come to an amicable settlement of the question. He saw Mr. Billson on the following day, and after further discussion, he (Mr. Grimsley), subject to the approval of the mayor, sent the following letter to Mr. Billson:—

Re Gas Bill.

March 29, 1877.

Dear Sir,—In view of the severe fight which awaits us in Parliament, I should much prefer, if possible, to arrive at an amicable settlement of the question in dispute, and with that object I should be glad if you would call your directors together to lay before them the following suggestion:—Although you cannot derive, under any circumstances, more than 14s. per share on the C shares, if your directors are willing to make us an offer of the concern on the following basis—namely, a guarantee from the corporation of 16s. per share perpetual annuities, redeemable by the corporation at six months notice whenever they think fit, at 25 years purchase, and the same proportion to be paid for the other shares—I will do my best to get the offer accepted, the reserve-fund, of course, to be considered as belonging to the corporation. I wish it clearly to be understood that this offer is made without prejudice, and is not to be used on either side in Parliament, in the event of nothing coming of it; and that it is also subject to the necessary clauses being inserted in the Act to carry out the agreement.

I am, dear Sir, yours very faithfully,
W. Grimsley.

To William Billson, jun., Esq.

At a subsequent interview with Mr. Billson, he found that the directors and shareholders were prepared to accept the offer they had made, and the only point of difference between them was as to the reserve-fund. He (Mr. Grimsley) said that the fund must necessarily belong to the corporation, inasmuch as it would form an element in the renewal of any of the works which might be worn out by long usage. Mr. Billson suggested, on the part of the directors, that the sum of £6000 should be retained out of the fund for the purpose of winding up the concern, and for any other matters the directors might have found out. At that time he thought Alderman Stafford should be consulted; and himself, the mayor, and Alderman Stafford finally decided that £4000 should be offered instead of £6000. He (Mr. Grimsley) had also taken the opportunity of consulting Mr. Bramwell, the able engineer who had inspected the works in company with the borough surveyor and himself, and finding that such a sum was a very liberal one, Mr. Billson, on the part of the directors, agreed to settle that as the amount. Having told the council what they had to pay for the undertaking of the company, the next question for consideration would naturally be what would they get for their money? At the present time the dividends paid to the shareholders of the company amounted to £16,672 10s. annually. The annuities which the corporation would have to pay upon the basis of settlement would be £19,054 4s.; therefore they

would give to the shareholders an increase of £2381 14s. per year. The net profit of the company last year, as shown by the balance-sheet, after deducting the sum of £500 paid to the directors for their fees, amounted to £5438 12s. 8d., but he thought it only right that they should add the £500, as it would be saved when the transfer took place, inasmuch as three of the gentlemen who were now very active directors were members of the corporation, and he had no doubt they would be pleased to place their services at the disposal of the town upon the same terms as they did the general work. The company in the second half of last year found that they really had made so much profit that they did not know what to do with it, as they could not divide it because the law prohibited it. They could not add to the reserve-fund because the law prohibited it, and therefore to relieve themselves of a difficulty which was not often felt in financial matters, they charged an item of about £3000 to the reserve-fund, instead of to capital account. If that item of £3000 was added to the £5438, the actual profit of the company, and also the £500 fees paid to the directors, there was shown to be a total profit upon last year's working of £8938. He held that the directors had exercised a wise discretion in making terms which would ensure to their shareholders a very handsome increase upon their existing dividends. The future advantages of the company might or might not be worth a considerable sum to the shareholders, and in consideration of their surrendering the right to any of those advantages, they had secured something like one per cent. more dividend than they could possibly have received under existing circumstances, and that without the slightest risk. The shareholders, therefore, had no reason to be dissatisfied, and the town had no reason to be dissatisfied. He felt that this was a transaction which was creditable to the directors and creditable to the corporation; and what was better, it was profitable to both parties. Then he would remark that the corporation were not taking to a concern which was worn out. He had no hesitation whatever in saying that the condition of the works was equal to any in the kingdom, and that was the opinion of the engineer whom they had engaged. When the council came to consider that they had works in first-class order, that they had a concern which would leave the corporation a handsome profit, he could not conceive for one moment that there would be a member of the council who would vote against the resolution. With regard to the reserve-fund, he remarked that it was not often when they bought a concern that they had to take to something like £30,000 of reserve-fund; but having that amount to fall back upon in any contingency that might arise, they had every reason to be satisfied with the arrangements made. He had every confidence in believing that the ratepayers of Leicester, when they knew the terms, would be gratified at the result. Mr. Billson, jun., who was charged to conduct the negotiations on the part of the directors, had discharged his duty in a manner which had made him personally, and he was sure the council also, under a deep obligation to him; and he hoped there would be a feeling expressed that morning of high appreciation, not only of the services he had rendered in connexion with this matter, but with the liberal conduct on the part of the directors in promoting the settlement of a transaction which, he ventured to believe, would be regarded in future years as a stupendous monument of the wisdom of those who were concerned in it, and which would gladden the hearts of those who might succeed them when their days of service were over.

Alderman Baines and Alderman Burgess expressed approval of the arrangements which had been entered into between the committee and the company.

Mr. Berry said he had no faith in the corporation managing this sort of thing. He thought the town would receive as much benefit from the works being in the hands of the company, as from the corporation. He did not think the ratepayers, four years hence, would have quite so much to congratulate themselves upon as the present directors would have. He wished to know whether the corporation were going to promote the Bill, and then commit the suicidal things it was prognosticated the company would do if they got the Bill.

Alderman Stafford remarked that the 8th clause in the articles of agreement provided for what Mr. Berry complained about.

Mr. Fowler supported the resolution, maintaining that there was a great difference between the circumstances connected with the water-works question and the present, and therefore it was consistent that he and others should support the resolution. Mr. Grimsley had put the most rosy hue upon this matter, and a great deal of credence must be given to the statements he had made. He did not wish them to think it was to be the happy reality Mr. Grimsley had described to them. He honestly believed, however, that the directors were making a good bargain, and that the corporation were making an equally good one.

Mr. Windley congratulated the council upon the eminent services which Mr. Grimsley had rendered to the corporation and the town in this matter. It had been said that they had no right to compare this business with that of the water-works, and he was well aware that comparisons were odious. He hoped Mr. Grimsley would converse with gentlemen connected with the water-works, and startle the council some morning by the announcement that the directors were willing to sell their works to the town.

Alderman Stevenson bore his testimony to the good spirit in which the negotiations had been carried on by the gas company, and also by Mr. Grimsley on the part of the corporation.

After some further conversation, the motion for the adoption of the report was put, and carried unanimously.

EXHIBITION OF GAS APPARATUS AT SOUTH SHIELDS.

As our readers are aware, from the notices in the "Circular" and our advertising columns, it has been some time in contemplation to hold an exhibition of gas apparatus, demonstrating the applicability of gas to heating, cooking, and other purposes of utility other than for giving light. On Monday, the 9th inst., the efforts of the gas company, their engineer, Mr. Warner, their secretary, Mr. Penney, and the deputy-engineer, Mr. Bolton, were crowned with success by the opening, in the large hall of the Free Library Buildings, Ocean Road, an exhibition, which is entitled to rank as one of the most useful on record. It contained upwards of 300 articles that, with scarcely a single exception, were adapted, not as mere ingenious devices, but as articles of practical daily use either in the mansion, the villa, the cottage, or the laboratory.

It was originally intended that the exhibition should be open for three days only; but so numerous were the visitors, and so great was the interest excited, that on the morning of the second day the inhabitants of the town presented a requisition to the gas company, signed by some 500 persons, begging that the exhibition should continue open for the rest of the week. To this the directors replied by consenting to keep it open till Friday night, beyond which they were unable to go, in consequence of the hall being required for other purposes. It is estimated by a gentleman intimately acquainted with the building, and the quantity of persons the hall will contain, that on this occasion there has been upwards of 30,000 visitors. It has been without doubt in every way a most complete success, and far exceeding the most sanguine expectations of the promoters, who certainly are deserving of not only the thanks of the inhabitants of Shields and the neighbouring towns, but the gratitude of every gas company in the kingdom, for inaugurating a movement that can result only in the extended use of gas, and benefit to both consumer and supplier. In order to stimulate competition, and increase the interest of the show, the gas company offered seven silver medals to be given as prizes for the best article in each class. We are informed by the chairman that the response on the part of the manufacturers was, however, not so hearty as could be expected until the names of the judges (Mr. John Pattinson, analytical chemist, of Newcastle-on-Tyne, and Mr. W. H. Bennett, C.E., Secretary of the British Association of Gas Managers) were announced, when the increase in the number of intending exhibitors and applications for additional space was most marked.

The exhibits were divided into seven classes, a description of which is as follows:—

Class 1.—*Efficient and durable portable stoves for boiling, frying, and grilling, suitable for a mechanic's home.*—Messrs. Davis and Son, Bath, exhibited a cooking stove and boiling stand. The Economic Gas Range and Roaster Company, London, a cooking stove and roaster. J. Wynn, a registered oven. J. E. Prust, 78, Smallbrook Street, Birmingham, three cookers, one of which obtained a silver medal. S. Leoni and Co., 15 stoves and cookers of various sizes and degrees of completeness. G. Goldsmith, Leicester, one workman's cooker, capable of cooking a steak or couple of chops and half-a-dozen potatoes in about half an hour, with an expenditure of about 3½ cubic feet of gas. (Honourable mention.) Thermostatic Cooker Company, two stoves, hot plate, and grill. Billing and Co., London, three stoves (one of which received honourable mention), hot plates, and boilers.

Class 2.—*Family gas cooking stoves.*—Davis and Son, Bath, a cooking stove. Economic Gas Range and Roaster Company, London, a range, cooking stove, and roaster. J. Wynn, Cheltenham, cooking stove. J. and J. Braddock, Oldham, a cooking stove. J. E. Prust, Birmingham, four cookers, one of which obtained honourable mention. Leoni and Co., London, ten stoves (one of which received honourable mention) and boilers. John Wright and Co., Birmingham, 12 cookers, one of which obtained the silver medal. Thermostatic Stove Company, London, two cookers. James Gray and Son, Edinburgh, two cookers. John Beverley and Son, Leeds, one cooker, obtaining honourable mention. Billing and Co., London, two cookers, one of which obtained honourable mention.

Class 3.—*Gas-baths.*—Ewart and Son, London, one bath. Charles Wilson, Leeds, one bath, to which was awarded the silver medal. Davis and Son, of Bath, circulating boiler for bath. W. and B. Cowan, Edinburgh, vapour bath. S. Leoni and Co., London, two boilers for baths. John Wright and Co., Birmingham, two baths.

Class 4.—*Closed apparatus for heating halls or conservatories either by hot air or water.*—Davis and Son, Bath, a cylindrical stove. Economic Gas Range and Roaster Company, London, a conservatory stove, two room stoves. S. Leoni and Co., London, nine caloriferes. C. Erzard, Bradford, one stove. John Wright and Co., Birmingham, two hot-water apparatus (for one of which the silver medal was awarded), 12 stoves, and 14 caloriferes. Tangye Brothers and Rake, Newcastle, one gas boiler.

Class 5.—*Open gas-fires.*—S. Leoni and Co., four gas-fires (to one of which the silver medal was awarded), and cheerfuls. J. Wright and Co., Birmingham, five gas-fires and cheerfuls. Billing and Co., London, six cheerfuls.

Class 6.—*Gas-engines.*—Crossley Brothers, Manchester, a gas-engine (to which the silver medal was awarded after being tested), Messrs. Louis Simon and Simons, of Nottingham, being permitted by the judges to withdraw their engine from competition.

Class 7.—*Novel applications of gas to articles of general utility.*—Charles Wilson, Leeds, lace singer. T. Dalziel, Kilmarnock, horse singer. W. and B. Cowan, Edinburgh, still. Gas-Fire Lighter Company, Birmingham, fire-lighters. Mawson and Swan, Newcastle, articles of utility in pursuit of scientific investigation and research in the laboratory, as furnaces, electric burners, thermo-electric pile, thermostat, hot-air blast blowpipes, assaying moulds, in all of which gas is applied. S. Leoni and Co., two laundry stoves, three tailors stoves. C. Erzard, Bradford, six sets of laundry, tailors, and other irons, so cast as to admit of the heat from a Wallace's burner to pass into and through them. (For these the silver medal was awarded.) J. Hepworth, Carlisle, calender heated by gas. G. Goldsmith and J. Dilkes, coffee-roaster, tailor's goose-heating stove, laundry iron-heating stove, &c., in which the gas is so arranged that the weight of the iron when placed in the stove opens the gas-tap, and when it is removed shuts the gas-way, so that but a minimum of gas escapes, or only sufficient to light the full burner when required, thus ensuring great economy of gas. John Wright and Co., Birmingham, two hot-water cisterns, four steamers, one muller, three tailors stoves, three ironing stoves, three cigar lighters, one horse singer, one tinman's stove, two nursery brackets. W. J. Rennoldson, self-feeding evaporating apparatus. C. S. Robinson, Leicester, soldering-iron heater, with Bunsen burner, fitted with patent gas and air tap; lead-melting cup, with stand similarly fitted. H. Trotter, automatic gas lighter and extinguisher. W. Cowan, fomenting apparatus.

The exhibition was announced to be open at noon, and although it was a short time past that hour ere everything was got into working order, those who possessed the necessary tickets were then admitted. Amongst those present were the Mayor of South Shields (Alderman Stainton), the Mayor of Jarrow (Alderman Berkley), the Rev. T. H. Chester (Vicar of South Shields), the Rev. C. E. Adamson, the Rev. T. N. Roberts, Mr. J. M. Moore (Town-Clerk of South Shields), Alderman T. Glover and Mrs. Glover, Mr. Robert Wallis (chairman of the South Shields Gas Company), and Mrs. Wallis, Mr. W. Anderson (Bent House), Mr. John Henderson (Horsley Hill), and Mrs. Henderson; Mr. Thomas Stainton, and Mrs. Stainton (Sunderland), Miss Horsfield (Sunderland), Alderman J. B. Dale and Mrs. Dale, Dr. Armstrong, Mr. J. L. Hall and Mrs. Hall, Mr. John Ridley, Mr. W. J. Warner and Mrs. Warner, Mr. J. H. Penney, Mr. Belton, Mr. R. P. Spice (president of the British Association of Gas Managers); Mr. Hutchinson (president), and Mr. W. Longworth (secretary of the Manchester District Association of Gas Managers); Mr. J. Hepworth, Carlisle; Mr. W. Smith, Hyde, near Manchester; Mr. Harold Hunter, Stalybridge; Mr. Donaldson, Edinburgh; Colonel Shippey, Birtley; Mr. G. Williamson (chairman of the Tynemouth Gas Company); Mr. W. Hardie (secretary to the Newcastle Gas Company); Mr. W. H. Atkinson (secretary to the Tynemouth Gas Company); Colonel Allison, and a numerous assembly of the gentry and influential inhabitants of Shields and the surrounding towns.

There was no formal opening, but Mr. Robert Wallis, chairman of the company, introduced Mr. R. P. Spice, president for this year of the British Association of Gas Managers, and, in doing so, remarked that Mr. Spice was one of the most eminent gas engineers of the day.

Mr. Spice, who was received with much applause, said that the chairman of the South Shields Gas Company, in inviting him to be present on that occasion, had done honour not only to himself, but at the same time to the British Association of Gas Managers, of which he was president for the year. It would be seen from the exhibition that gas could be used in the daytime for cooking purposes, and also in a variety of other useful ways, which would tend to reduce the cost of gas to the consumer. He had had much pleasure in being present to witness the various articles represented at the exhibition, which had been so wisely and so liberally inaugurated. The exhibition was a most important event, and it would long be remembered in the annals of the gas industry of the United King-

dom. He congratulated the South Shields Gas Company upon the successful result of the exhibition. It was the first of the kind held in England, and, therefore, great credit was due to the chairman of the company for his special exertions in the matter. The idea of applying gas to cooking and heating purposes was not a new one, and he was pleased to bear his testimony to the credit being due to Mr. Goddard, of Ipswich, and the late Mr. Sharp, of Southampton, who had laboured many years in the work, and Mr. Warner, his kind friend, was also deserving of notice, for his efforts had been the means of establishing the Association of which he (Mr. Spice) was the representative that day, and which was established in 1863. South Shields was entitled to the honour of bringing before the United Kingdom the benefits, advantages, and economy to be derived from the various contrivances which were exhibited in that room. He concluded by calling upon the company to give three hearty cheers for the directors, officers, and shareholders of the South Shields Gas Company.

Three cheers having been given,

Mr. Warner rose to acknowledge the compliment, and in doing so remarked that Mr. Spice himself had devoted a great deal of attention to the subject of gas, and he was greatly pleased to find that, on an occasion of this kind, the exhibition was not only countenanced but encouraged by the presence of one who was ever ready to promote the interests of both gas companies and consumers, and who held a prominent position in the foremost rank of gas engineers.

This part of the proceedings then terminated.

At a later period of the day, a large number of ladies and gentlemen were entertained by the directors of the company to luncheon in the reading-room of the institution. The whole of the viands were cooked in the hall by the apparatus exhibited, and in the presence of the company, by a professional cook from the Crystal Palace, Sydenham, the general arrangements being under the superintendence of Mr. W. A. Dunn, Fowler Street. Mr. R. Wallis, of Old Ridley, occupied the chair; and he was supported by the Mayor of South Shields (Alderman M. Stainton), the Mayor of Jarrow (Alderman P. A. Berkley), the Rev. T. H. Chester (Vicar of South Shields), Mr. W. Anderson (Bent House), Mr. John Henderson (Horsley Hill), &c. The vice-chair was occupied by Mr. J. L. Hall.

The Chairman having proposed "The Queen," which was enthusiastically received, again rose, and after expressing the pleasure afforded to the directors by such a large gathering that day, remarked that the success which had been experienced showed that the holding of such an exhibition as they had opened that day was a step in the right direction. After referring to the various purposes to which gas was now applied, the chairman went on to say that it had often been remarked that there was nothing new under the sun, but he really thought that this was the first time in the history of this country on which an exhibition of gas apparatus had been held. In connexion with the exhibition many novelties were exhibited, and he had no doubt, now that it had been shown to how many purposes, in domestic economy especially, gas could be applied, that many persons would be induced to adopt, and particularly after noticing the attractive cooking ranges which were manufactured, and which were found to be so well adapted for the purpose intended. He concluded by proposing—"Success to the first exhibition of gas apparatus," coupling with the toast the health of Mr. Spice, president of the British Association of Gas Managers.

Mr. Spice, in acknowledging the compliment, said that the exhibition did great credit to the directors of the South Shields Gas Company, and their talented engineer, Mr. W. J. Warner, who, he was given to understand, first shadowed forth the idea so warmly and spiritedly undertaken by the directors, and with a result that did honour to all concerned, and which his hearers, he believed, fully appreciated.

The Chairman then proposed the health of the judges, Messrs. John Pattinson, of Newcastle, and W. H. Bennett, of London.

Mr. Pattinson replied, and, in doing so, said that he had no doubt the example of the directors of the South Shields Gas Company would speedily be followed by many other gas companies throughout the kingdom.

Mr. Bennett also responded, and remarked that all gas companies acting under statutory powers had to incur certain legal responsibilities, and he believed the South Shields Company had not only fulfilled all that could be required of them in this respect, but that they had also fulfilled a moral responsibility by doing the utmost they could to enlighten their consumers, and teach them the best way to economize and take advantage of the gas supplied to them. He thanked both the company and the exhibitors for the compliment paid to him in appointing him as one of their judges.

Mr. J. M. Moore afterwards proposed—"Success to the borough of South Shields," coupled with the name of Mr. Robert Wallis, the chairman of the gas company.

Mr. Wallis rose amidst great applause, and briefly acknowledged the compliment, in the course of his remarks alluding to the fact that the luncheon of which they had partaken neither smelt nor tasted of gas.

Mr. Wynn (Cheltenham) expressed, as a stranger and an exhibitor, his thanks for the manner in which the South Shields Gas Company had received and treated him and the other exhibitors.

Mr. Warner responded, and after expressing a hope that the use of gas would become much more general for cooking than at present, referred, as a proof of the adaptability of gas for such a purpose, to the excellent cooking of the meat in the presence of so great a crowd as had been assembled.

The proceedings shortly after terminated.

On Tuesday the directors entertained about 80 gentlemen, mostly managers and secretaries of gas companies, to a luncheon, cooked, as on the previous day, by gas in the apparatus exhibited in the hall, the soup, fish, joints, vegetables, and pastry being pronounced excellent by every one who partook.

On Wednesday evening a lecture by Mr. Hugh Lee Pattinson was delivered, and Mr. Warner read the following paper:—

Ladies and Gentlemen,—To me it appears almost impossible to overestimate the value of exhibitions such as the one just inaugurated. To the directors of the gas company, South Shields and its neighbourhood are greatly indebted. The gas companies, too, of far distant places, as well as those nearer home, will be more or less benefited by the enterprising directors of this company, and by the incessant labours of our estimable chairman and his most worthy colleagues, Messrs. Hall and Henderson, to make this undertaking a success. At their request I have to apologize to those who have visited the exhibition for not having published a catalogue. The time was, however, necessarily so limited for getting the articles into their places, that it was impossible to prepare and print a catalogue in time for the opening. Though thus deprived of the pleasure of consulting a catalogue in a crowded exhibition, it is hoped there has been no lack of means for imparting information. Besides the exhibitors, to whom we are all indebted for their attendance, the company's officers have been in constant attendance to explain and put into operation the articles so well exhibited. The work per cubic foot of gas, whether employed for heating, cooking, or motive power, must necessarily be the measure for comparison. We may fairly say, then, that those articles which do the greatest amount of work per cubic foot of gas consumed, will be economically the most perfect, whether the gas be employed for heating, cooking, or motive power. The economy must be dependent on the construction and arrangement of the burners and valves in connexion with them, and also upon the construction of the apparatus itself. So many rival claims are set up for various descriptions of burners, that the committee would have felt justified in offering a medal for competition, had it not been thought this would have carried them beyond the objects of the exhibition, which was to be exclusively, or as far as possibly so, of a decidedly practical character; thus it will be seen that the burner could only be dealt with as forming a portion of a whole or a part of an apparatus. As it has been in the case of lighting, so it must necessarily be in the application of gas to other purposes; economy must be a very necessary element in its success; you should, therefore, convince yourselves that it does possess this quality. By this I do not mean that gas can, for all purposes, be placed in competition with coal or coke as a fuel, without reference to the nature of the apparatus or the work to be done. That there is economy in its use for domestic purposes, however, there is abundant proof. Without entering into the experiments of the judges, the exhibitors can give you the results of many experiments and long years of experience. I will give you but two facts; one abroad, the other at home. Sir Edmund Hay Currie, chairman of the London Hospital, says "the gas-cooking system has been carried on for the past six years at this establishment; that the waste in cooking is materially reduced, while as to economy, in comparison with other fuel, we have reason to know that the consumption of gas to the kitchen of the hospital (which has upwards of 600 indoor patients and a corresponding staff of attendants) is something over 1800 feet, representing about 7s. per day, the cooking being done on two days in every week partly by gas, and the other five days entirely; £500 a year is the average saving in meat alone." The other fact is this. The consumption of gas during the recent course of lectures upon cooking in this hall was 6300 cubic feet; the cost was £1 2s. 1d., or 7s. per week for the numberless dishes which were cooked; and the whole of the gas registered was not consumed, one of the pipes having been broken during the lectures, and not discovered for some time. It is not solely upon the grounds of economy that the use of gas is recommended for domestic purposes, but also upon its controllability, and, therefore, its adaptability to all domestic requirements—it will cook an ox as well and with as much ease as a beefsteak, or drive a steam-engine as well as it will simmer a little beef-tea. On talking over this matter with a kind exhibitor, Mr. Swan, of Newcastle, he said to him it always appeared that the distribution of gas was the perfection of civilization; but, he added, "we burn it like heathens." This brings me to another point, upon which I may give you a word of advice; do not believe what some makers and others will tell you about a flue; such is just as necessary with gas as any other kind of fuel. With apparatus for warming apartments, the products of combustion, however, may be, and should be, kept quite out of the apartments; hence the beautiful adaptability, and the uniformity of temperature that may be maintained, by gas for the heating of apartments. In the heating of baths there is another requirement—expeditiousness; in this gas stands pre-eminently alone. This quality is absolutely essential for an occasional fire. With most English people, too, sight as well as feeling must be gratified. For a drawing-room in changeable weather, or on a chilly summer evening, the open "cheerful" gas-fire answers its purpose most admirably. From the drawing-room to the workshop or kitchen, what a change! Can there be a greater? Gas, like the atmosphere, pervades every place in a large city, and answers the purposes of all alike. Just as safely and as easily, without soiling the fingers, the lady may, after lighting her drawing-room fire, descend to the offices and start an engine to do the drudgery of her household. As a source of power, either indirectly, as applied to a boiler for raising steam, or directly by the explosion of the gas, we have a motive power that will at no distant day be generally applied wherever a gas-pipe is laid. Engines set in motion are no toys or philosophical playthings. An engine constructed on the same principles as one of those you see at work, has been in use for some time now in Sir William Armstrong's works. In the apparatus exhibited it will be observed that the energies of the designers have not been exclusively directed to the principles of construction, the form and configuration have been much improved; there is an excellent display of artistic talent. The manufacturers have well responded to our invitation to produce a cheap stove for the million; there are marvels of cheapness displayed. If the blessings of gas-cooking do not fall equally upon the poor as the rich, it will not be the fault of the manufacturers any more than the sin of the consumers ignorance can be laid at the door of ourselves. Besides those things which the exhibition was intended to make you familiar with, others will be found exhibited of a most interesting character. The calendering machine, useful to dyers and others, exhibited through the kindness of Mr. Hepworth, of the Carlisle Gas-Works, whose invention it is, does excellent work. There is, too, the beautiful singeing-machine of Mr. C. Wilson, the patentee, Leeds, which shows, as nothing else can, the perfect controllability of gas-flames to perfect and finish the beautiful productions of the lace manufacturer, the loose fibres of the lace being burnt off by passing the lace through a gas-flame. Mr. Swan, of Newcastle, exhibits some of the most interesting articles—one, a beautiful application of pure science to the common requirements of every-day life. The apparatus is called a thermostat; it is for the purpose of maintaining a uniform temperature, to within a degree, by means of an electric current. There are also the interesting contrivances of Mr. Cowan and Mr. Morrison, of Edinburgh—water still, vapour bath, and gas furnaces. Can I say more to interest you in this exhibition? The gas-pipes appear to be not only "the perfection of civilization," but the conduits of mighty forces—light, heat, power—the elements of which were created, gathered, and stored by our heavenly Father through long past ages to refine, elevate, and bless mankind.

The paper read by Mr. Warner was listened to with great attention.

On the two following days—Thursday and Friday—the hall continued to be attended by throngs of interested visitors, and on Friday evening the exhibition was brought to a close by the mayor proposing a vote of thanks to the chairman and directors for the public-spiritedness and liberality shown on this occasion. The vote was heartily responded to by a round of cheers from the crowded hall, and acknowledged by Mr. Hall, one of the directors.

Thus ended one of the most satisfactory demonstrations of the applicability of gas to the many purposes occurring in daily life. The arrangements made were such as reflected the very greatest credit upon all who were engaged in the undertaking, and for all time to come the South Shields Gas Company and their officials will be pointed at as examples it will be the duty of others to follow.

Royal Institution.—Mr. James Dewar, F.R.S.E., Jacksonian Professor of Natural Experimental Philosophy in the University of Cambridge, was on Tuesday last elected Fullerian Professor of Chemistry, in the room of Dr. J. H. Gladstone, resigned.

Birmingham Water Supply.—Dr. Hill, Medical Officer of Health for Birmingham, reports that the water supplied to that town during March was slightly turbid, but showed a marked diminution in the amount of organic matter.

THE CHEMISTRY OF GAS MANUFACTURE.

By A. Vernon Harcourt, Esq., F.R.S.,
One of the Metropolitan Gas Referees.

[A course of Four Cantor Lectures delivered at the Society of Arts, London.]

Third Lecture.—Monday, March 19.

The substances which we have considered hitherto have been those removed from coal gas in the processes of condensation and purification. Fortunately, we can succeed in the manufacture of coal gas, in retaining those substances which are valuable as giving light or heat, and removing those which either diminish the power which the gas has of giving light, or are in other ways injurious. I have placed again upon the wall the diagram illustrating the apparatus by which gas is purified. I spoke in my last lecture of the two alternative materials employed for the removal of sulphuretted hydrogen. The diagram is intended to show an iron box with two layers of oxide of iron, through which the gas passes; and, either by this material or by lime, sulphuretted hydrogen is wholly removed from the gas. There is another of the ingredients of coal gas always present in the crude gas, which may or may not be removed by purification—namely, carbonic acid. In the table to the right are some analyses, made several years ago by Dr. Frankland, of the composition of gas as it is supplied to the consumer, and they represent accurately enough the composition of gas as it is made now, there having been no material alteration in the process of manufacture.

You will see that the gas is here divided into what are termed *illuminating hydrocarbons*, of which ethylene or olefiant gas is the principal; *marsh gas*, and *hydrogen*, which together form, by volume, much the larger proportion of the gas; *carbonic oxide*, which comes third in order of quantity; and, besides these, there are small proportions of *carbonic acid*, and of *nitrogen* and *oxygen*. I propose, in my next lecture, to speak of those which are the more important constituents of coal gas, for the purposes for which we use it; and, in the present one, to direct your attention to this substance (carbonic acid), and to another substance chemically resembling it, in which the carbon is combined, not with two atoms of oxygen, but with two atoms of sulphur—namely, carbon bisulphide.

I will show you, in the first place, a familiar experiment, to illustrate the formation and properties of carbonic acid. When a piece of charcoal is heated in the air, we all know that it burns, but not very readily; that, in fact, many pieces must be placed together, in order, by the exchange of heat between them, to maintain a sufficient temperature for their combustion with the oxygen of the air. But if I take, instead of air, a bottle of oxygen, and transfer the piece of charcoal, which is still alight, to the oxygen, you see the brilliant combustion which takes place. That combustion consists in the union of the carbon and the oxygen, the two substances which the bottle contains. They combine directly together, forming carbonic acid or carbon dioxide.

I will allow the carbon to burn, and I will show you the properties of the gas which is formed, using another bottle which has been previously filled with it. Observe, first, the property which carbonic acid has of extinguishing flame. A lighted taper lowered into the bottle is extinguished. This, of course, is a negative property, and shows only that carbonic acid is not air or oxygen, and will not do what air or oxygen will do—namely, combine with the carbon and hydrogen of the taper. Another property of the gas is its high specific gravity as compared with air. If I take this bottle of carbonic acid, and pour it into what we call an empty bottle—that is, a bottle filled with air, we shall, owing to the difference of specific gravity between them, obtain an exchange of their contents. The difference is not like that between water and air; the gas pours rather slowly, but probably I have now effected a transference. The uppermost bottle has lost its carbonic acid, and becomes filled with air, as you see from the way in which the taper burns in it. The lower bottle has received the greater part of the carbonic acid, as you see from the extinction of the taper.

Another property of carbonic acid is the power which it has of uniting with lime. I have here a solution of lime in water. If I take this solution, which is now perfectly clear, so that it looks like pure water, and pour it into the bottle of carbonic acid, and bring it in contact with the gas by shaking the bottle, you see the milkiness which is produced. This illustrates a chemical change which occurs in the manufacture of coal gas. It is on the affinity between carbonic acid and lime, manifested by the precipitation of the lime in this experiment, that the purification of coal gas from carbonic acid by the action of lime depends.

The formation of carbonic acid in the manufacture of coal gas is probably due to a very small extent, if at all, to the direct action of the air upon the carbon of the coal. This can only happen where the exhaustion—as the pumping of the gas out of the retorts is called—is carried too far, so that the pressure in the retorts is less than the atmospheric pressure. In this case some of the air or furnace gas, from outside, enters through the pores or cracks in the clay retorts, and becomes mixed with the gas. The small percentage of nitrogen which is usually found when coal gas is analyzed, and the further fact that this nitrogen is generally accompanied by oxygen, show that this is not a common occurrence. The main source of carbonic acid, no doubt, is a reaction between the water, which the coal placed in the retorts contains, and the heated carbon. In the manufacture of what is called water-gas—that is, gas produced by the action of steam upon red-hot coke—there are formed three gases—hydrogen, carbonic oxide, and carbonic acid, the proportion between them depending on the temperature at which the coke is maintained. The same reaction happens to some extent in the gas-retort in the ordinary manufacture of coal gas. There is always water in the coal, and as the outer part of the charge lying next to the heated sides of the retort becomes red hot before this water is wholly expelled from the interior of the charge, this same action of steam upon heated coke takes place, and one of the products is carbonic acid.

For the removal of the carbonic acid purification by lime is perfectly sufficient, if only the lime is applied in sufficient quantity, and renewed sufficiently often. The presence of carbonic acid in the gas is no injury to the consumer, provided the gas supplied is of sufficiently high illuminating power; that is to say—provided the illuminating power of the gas is fixed, it matters nothing to the consumer whether he is supplied with a gas which is somewhat richer, and whose illuminating power is to some extent diminished by the presence of carbonic acid, or with a gas otherwise poorer, but free from carbonic acid. Although this substance is injurious when present in any large proportion in the air, yet no objection to the presence of carbonic acid in coal gas can reasonably be made on this ground, since the quantity of carbonic acid yielded by burning gas is not materially affected by its presence in the unburnt gas. Two of the ingredients of coal gas—marsh gas and carbonic oxide—yield their own volume of carbonic acid when they are burnt; and the olefines yield twice, or more than twice, their volume. On the whole, the volume of carbonic acid discharged into a room where gas is burnt is more than it would be if the gas contained 50 per cent. of carbonic acid, the rest being hydrogen. It has, however, been proved that the presence of carbonic acid in coal gas has a decidedly injurious effect upon its illuminating power, and since the formation of carbonic acid cannot practically be avoided, either it must be removed by some subsequent process, or the proportion of illuminating constituents must be increased by mixing with the ordinary coal a larger proportion of the more costly cannel, or by heating the retorts less strongly, which improves the quality at the expense of the quantity of the gas. Therefore, in the interest of the maker of gas, it is desirable to remove carbonic acid. At present the only mode which is in general use for effecting this object is passing the gas through trays or sieves on which damp slaked lime is placed.

I come next to the substance which I spoke of as being chemically analogous to carbonic acid—carbon bisulphide. I have here a little bottle containing a small quantity of this substance. When pure, it is quite colourless, and of an odour which is not unpleasant, resembling the odour of chloroform. Commonly, it is not pure, and has a slightly yellow colour, and an unpleasant smell. It is very volatile, having a low boiling point and a high vapour-tension at the ordinary temperature. If I pour a few drops of this liquid into a bottle of air, and cause the vapour to displace and diffuse through the air, by shaking the bottle and at intervals raising the stopper, and then pour the heavy gas out of the bottle into this beaker, leaving any liquid there may be still remaining at the bottom of the bottle, and then apply a light to the contents of the beaker, you see the inflammation and gradual combustion of the gaseous carbon bisulphide. This experiment shows, in the first place, that the liquid is very volatile, for it has in a minute or two formed sufficient gas to have nearly filled the bottle into which it was dropped; in the next place, that it is heavy, for I poured it quickly through the air, from one vessel into another; in the third place, that it is inflammable—it lights and burns readily. But I might have shown you that it is very much more inflammable than most substances—that is to say, that the temperature required for its inflammation is much lower than that of coal gas, or most inflammable substances; for if, instead of applying a taper, I had simply heated a glass rod in the lamp, and dipped that into the beaker, I should have succeeded equally well in lighting the carbon bisulphide. Its presence, even in small quantity, when mixed with hydrogen, imparts this property of ready inflammability to the gas; and just as the vapour of the liquid phosphide of hydrogen, or phosphoretted hydrogen, imparts to hydrogen or other inflammable gas the property of what we term spontaneous inflammability—that is, inflammability at the ordinary temperature — so this vapour of carbon bisulphide communicates the property of inflaming at a temperature above the ordinary temperature, but very much below that at which hydrogen would otherwise inflame.

You saw that the beaker in which I burnt the gas just now became opaque. This arises from the imperfect combustion which has taken place. The sulphur of the carbon bisulphide was only partially burnt, and so a part of it remains deposited like flowers of sulphur on the sides of the beaker. That part of the sulphur which was burnt united with the oxygen of the air to form sulphur dioxide, or sulphurous acid. When coal gas, or hydrogen containing the vapour of carbon bisulphide, is burnt in the air, probably in the first instance, the same substance—sulphurous acid—is formed. This oxide of sulphur is readily converted in the presence of air and moisture into another substance containing an additional atom of oxygen—sulphur trioxide; or into that which is formed by the union of this body with water—sulphuric acid. I will illustrate to you, in the first place, one or two of the properties of the gas, formed by burning carbon bisulphide or sulphur itself. I have here some sulphur burning dimly with a pale blue flame. You observe that the transference from the air to a bottle of oxygen produces the same increased vividness in its combustion which you saw before in the case of charcoal. The sulphur now burns with a comparatively bright violet flame; and here also, although in oxygen, the combustion is always imperfect. The white smoke which partly escapes from the bottle, and is partly deposited on its sides, is due to some of the sulphur, which is now boiling, passing through the flame, escaping unconsumed, and then being condensed into smoke. I will try to collect some of this gas, by letting the sulphur burn for a little while longer in the bottle of oxygen, and when it has become a little cooler I will examine its properties. This gas is readily soluble in water, and when coal gas is burnt the two substances are formed and travel away together, the volume of steam being, of course, very large relatively to the volume of sulphur dioxide. If we dissolve some of this gas in water, we have at first simply a solution of it, but if that solution is allowed to stand for some while exposed to the air, and we examine it from time to time, we shall find there is in it an increasing quantity of the more oxidized and more permanent product of the union of sulphur and oxygen—namely, sulphuric acid. I have here an apparatus which is used for testing the amount of sulphur in coal gas, and which I have placed here intending to speak of it presently in referring to the modes in which the amount of sulphur in coal gas is ascertained. I will, however, refer to it now for another purpose.

If the little burner at the bottom of the tube is lighted, and the products of the combustion of the gas are allowed to pass up by themselves, without the addition of ammonia which is made when the apparatus is used as a sulphur test, and the condensed water, with what it holds in solution, is collected in the usual way, we shall always find that the liquid contains sulphuric acid; but not nearly so much as when the pieces of ammonium carbonate, ordinarily employed, are placed upon the stand around the burner. In some experiments that I made, I found that about one-fourth of the total sulphur which the gas contains is obtained as sulphuric acid, when no ammonium carbonate is used. It has been contended, on the one hand, that, when gas containing carbon bisulphide burns in the air, the sulphur is wholly converted into sulphuric acid; and it has also been contended, on the other hand, that the only product is sulphurous acid, and that no sulphuric acid at all is formed. I feel confident, from the experiments I have made, that the truth, as so often happens, lies between the two. If the experiment is made of placing pieces of ammonium carbonate within the lower chamber of the condensing-tube, instead of round the burner, or some pieces of caustic soda on the top of the glass balls,—in either way keeping the condensing surface bathed in alkali, instead of allowing the condensed water to become acid and the sulphurous acid which is formed to be exposed to the current of air which is passing through,—we find that the whole of the sulphur in the gas is present in the liquid at the bottom of the apparatus in the form of sulphate. This does not prove that when the gas is burnt the sulphur in it is converted into sulphuric acid, but only that when the glass balls are steeped in an alkaline liquid the sulphurous acid is retained, and that by the time the solution has trickled down into the beaker below, the salt formed is in the condition of sulphate. In the other case, where no alkali is used, but only condensed water, to arrest the products of combustion, sulphuric acid would be fixed as readily as before, since its aqueous solution surrenders none of it to a current of warm air, but sulphurous acid would be imperfectly retained. There is a very large volume of air passing up through the apparatus, and into this atmosphere the sulphurous acid readily diffuses out of the aqueous solution. I mentioned to you, in a former lecture, that a much more soluble substance than sulphurous acid—namely, ammonia — escapes entirely out of a solution freely exposed to the air. And that which happens to the solution of ammonia happens also to the solution of sulphurous acid. Allowed to stand, with a continuously renewed atmosphere over it, the gas diffuses out of its solution, consequently, a good deal of the gas which is formed escapes into the air, and it is necessary that there should be some alkali

present in order to combine with the sulphurous acid, and to form a fixed substance, such as sulphite of ammonium or sulphite of sodium, for it to be permanently retained. When it is thus retained, and exposed for a little time to a current of air, it is oxidized, and the final product is an alkaline sulphate.

I will now show you one or two of the properties of the sulphurous acid which I have formed in this bottle by the combustion of sulphur. I have here two coloured liquids, and I will show you the action which the gas has upon these liquids. I pour some of the sulphurous acid, which is more than twice as heavy as air, over the blue and over the red liquid in these two beakers, and stir with a glass rod. You see that in both cases the colour disappears.

Now the substances which I have here used are delicate chemical reagents; the blue liquid was iodide of starch, and the red liquid was permanganic acid—an acid solution of permanganate of potash. I would not have you suppose that the effect which sulphurous acid has on these liquids at all represents the action of the diluted gas upon ordinary colouring matters. It is true that by the gas, in so concentrated a form, many colouring matters are bleached; but when it is in a dilute form, its action upon colouring matters is, at any rate, exceedingly slight.

A question of much importance, both to the manufacturers and the consumers of gas, is that of the injury which is supposed to occur through the presence of small quantities of sulphurous or sulphuric acid in the air of rooms lighted by gas. As to its effect upon health, I do not believe that there is any evidence that the small proportion of sulphurous acid which can be present in the atmosphere of a fairly well-ventilated room, through the combustion in the room of an ordinary quantity of coal gas, containing no more than an ordinary quantity of sulphur, is prejudicial to health.

Then, again, as to the effect upon objects in the room—articles of furniture or books. The strongest evidence of an injurious effect thus produced appears to be in the case of the effect upon the binding of books. Several years ago there was a very careful investigation made into this matter at the Athenæum Club, by Faraday, Brande, and others. It was shown that the binding of the books was decaying; and it was observed also that the bindings suffered more, of books placed in the upper shelves, than of books in the lower shelves, and it was believed that this injury resulted from the introduction of gas for the lighting of the rooms of the club. It was proved also that sulphuric acid could be found in the air of the rooms. Vessels of water, exposing a large surface, were placed in different parts of the room, and it was shown that by degrees a considerable quantity of sulphuric acid was accumulated. But the evidence as to the injurious effect being due to the sulphur from the coal gas is very imperfect. Evidence was given by bookbinders that there had been a change in the mode of preparation of the leather used in the binding of the books—that more acid had been used after a certain date than before, and, in consequence, the bindings had not lasted so well. There were cases also of other libraries, in which no gas was used, where a similar decay in the bindings of the books had occurred, though to a less extent. Then as to the manner in which the injury was done. Supposing it were produced in some way or other by the gas, there was the further uncertainty whether it was due to the sulphur in the gas, or to the heat produced by the large quantity of gas burnt. As to the effect on pictures, it is certain that some pigments—ultramarine, for example—are injuriously affected by the deposition upon them of acid liquid, and the canvas at the back of pictures is said to be destroyed by the same agency. But I believe it is found in picture galleries which are now lighted by gas, and where, as no doubt should be the case, great care is taken with the ventilation, that no injury has resulted. There is, however, an objection which is very much more difficult to meet—namely, that persons living in rooms which are lighted with gas containing rather a large proportion of sulphur, find it disagreeable. Nor is this an objection which can be simply laughed at. It is not enough to say to a man who complains that he finds the atmosphere of his room unpleasant, that there is no evidence that that which he complains of is injurious to his health. It is not only that which can be shown to be prejudicial to health which can fairly be the subject of complaint. Nor are experiments upon the quantity of sulphurous acid present in the air of a gas-lighted room, nor the conclusions which may be drawn from the rate of ventilation, and the amount of sulphur burnt, as to the quantity of sulphurous acid which can possibly be present, conclusive as against the complaint that the atmosphere of the room is found to be unpleasant, and that the unpleasant smell is that of sulphurous acid. The only logical conclusion to which a comparison of these data can lead is, that a very small quantity of the gas is unpleasant. My own impression is that where ventilation is imperfect, as it commonly is, and the proportion of sulphur in the gas is rather large, it is possible to distinguish the presence of sulphurous acid. These direct sensations are not very describable to others; a certain sense rather perhaps of taste than of smell, which is familiar to travellers by the Metropolitan Railway, and is known to chemists as that which sulphurous acid produces, may be observed in these circumstances, when no fire is alight and sulphurous acid can proceed from no other source than the combustion of gas.

Really, the question resolves itself into a commercial question, as to what is the value of the impression which exists on this subject. Now, if it were possible that gas could be supplied otherwise than as a monopoly, and that consumers of gas could have the choice, which they would have—gas which cost rather less, say 3s. 9d. per 1000 cubic feet, and which contained some 35 grains of sulphur in 100 cubic feet), or gas which cost rather more, say 3s. 11d., and which contained less sulphur, say 10 or 12 grains in 100 cubic feet,—which would be preferred? I do not know what the general feeling is, but, for myself, considering both the sensible effect on the atmosphere of a room, and the likelihood of injury to articles of furniture from even a slight vitriolic dew, such as undoubtedly is deposited, I would rather pay the extra twopence and have the purer gas.

I pass now to the modes by which the carbon bisulphide in gas, supposing its removal desirable, can be removed. The process generally employed for its removal is the transmission of the gas through lime which has already served for removing sulphuretted hydrogen; and, as far as the immediate object is concerned, it is not possible to have a better agent. If coal gas, or hydrogen which has been charged with bisulphide of carbon, passes through a not excessive quantity of sulphide of calcium,—the substance into which the lime is changed by the action of the sulphuretted hydrogen—the bisulphide of carbon is wholly removed. I believe this removal can be effected almost as completely by the action of sulphide of calcium as that of carbonic acid, or sulphuretted hydrogen, by the agency of clean lime.

I have here a little apparatus which I contrived a year or two ago for the estimation of sulphur in coal gas. It consists of a small bulb, which is filled with pieces of pumice which have been steeped in solution of platinum, the object being to have in a small space a large surface. Through this bulb the gas passes; it is surrounded with a cylinder of porous clay, and there is a lamp burning with a very low flame beneath it. The gas enters by the tube, passes down to the bottom of the bulb, and then up through the heated material, and so out by the horizontal tube. Thence it passes downwards through the liquid in this glass. The liquid is a solution of lead in soda, mixed with some syrup or solution of sugar. The lead serves to give a dark colour with the sulphuretted hydrogen, which passes through the solution. The gas as it enters the apparatus is free from sulphuretted hydrogen, but the action of the heated surfaces upon it transforms the bisulphide of carbon which it contains, in presence of the hydrogen of the gas, into sulphuretted hydrogen. Thus the test consists of two parts. First, there is the action of the heated surfaces on the gas, which turns the bisulphide of carbon into sulphuretted hydrogen; and, secondly, there is a test for sulphuretted hydrogen—namely, this lead solution which is coloured by it. In order to make a quantitative estimation, I have by the side of the lead solution another glass, containing a liquid of a colour similar to that which the lead solution will acquire. The solution is not the same, for the solution which is coloured with sulphide of lead is not coloured permanently; by this light it is permanent, but exposed to daylight it quickly fades. All that is necessary is to have a solution, whose colour is fixed, comparable with that of the liquid coloured by the sulphide of lead. It is necessary also to know what quantity of gas is operated upon. That is ascertained by running the water from the aspirator, which draws the gas through, into this graduated cylinder. Then, on reading off the quantity of water, I know that from a volume of gas, which is equal to this volume of water, has been extracted a quantity of sulphur sufficient, in the form of sulphide of lead, to impart this degree of brownness to this volume of lead solution. That, of course, constitutes a quantitative test, and by the action of the heating apparatus it is applicable not only to gas containing sulphuretted hydrogen, but also to gas which does not contain sulphuretted hydrogen, but only bisulphide of carbon, for the estimation of the quantity of sulphur present in that form.

Besides calcium sulphide many other substances have been tried for the purification of gas from bisulphide of carbon. It would be very desirable, if it were possible, to use a liquid instead of a solid reagent for this purpose, because it would be much easier, in working with a liquid, to avoid that nuisance which is liable to be caused, unless special precautions are taken, by the handling of this sulphide of calcium, or, as it is justly called, "foul lime." I have made many experiments on this subject, and the results of a few I have made recently are written upon the board. I have tried with an apparatus which I showed you at my last lecture, and which is a very efficient form of washer for laboratory experiments, the action of various liquids upon the coal gas supplied in Oxford, which contains a very fair proportion of carbon bisulphide. These are some of my results. I made an examination first of the gas supplied to my laboratory, and found it contained 33½ grains of sulphur in 100 cubic feet. Then I passed gas, at the slow rate at which it travels through the testing apparatus, over a solution of ammonium sulphide—which is one of the liquids that have been recommended—and found that the amount of sulphur remained practically the same. Then I passed it over ammonium sulphide in which an extra dose of sulphur had been dissolved; the liquid dissolves sulphur readily, and acquires a bright yellow colour. Again I found that practically the sulphur was unaffected. Then I tried a solution which suggested itself to me as being likely to answer—a mixture of ammonium sulphide with calcium chloride. When these substances are mixed the lime is not precipitated, but remains in solution. We have, therefore, a solution probably containing ammonium chloride and calcium sulphide, and I thought this might answer as well as the solid calcium sulphide. I have given the actual numerical results obtained in the different experiments, but they are practically the same. There was no improvement produced by washing the gas with that reagent. Then I tried another substance, which has been recommended—a solution of sodium sulphide. It has been assumed that this solution would answer as well as the solid calcium sulphide itself. But again I found no effect was produced. I tried a solution of litharge in caustic alkali, and that again had no effect.

The only liquid which produced any effect upon the gas was some of the less volatile part of petroleum. It seemed likely that the reason why the other substances had no effect was that they were all dissolved in water. Bisulphide of carbon does not mix with water, and, consequently, substances which are in aqueous solution are as if they were varnished over and kept from contact with the carbon bisulphide. If we take a liquid which can be mixed with carbon bisulphide, such as alcohol—an alcoholic solution of potash, for instance—then we have an action. I found that the heavy petroleum mixes readily with carbon bisulphide; and I found, using that as a washing liquid, that there was, by no means a complete effect, but still a considerable effect, that the quantity of sulphur in the gas was reduced to something like one-half what it had been previously.

Another mode of removing carbon bisulphide from gas, which has suggested itself to various persons—I believe the first who brought it prominently forward was Mr. Bowditch, a good many years ago—is by acting upon the gas with heated surfaces. I use that expression rather than heating the gas; because I believe if it were possible to heat the gas without placing it in contact with heated surfaces, the effect would be little or none. When gas is brought into contact with heated surfaces—it is not necessary that their temperature should be even near that of a red heat—the change which I have already referred to in speaking of the action of the colour test takes place, and the hydrogen of the gas and the carbon disulphide act upon one another, and sulphuretted hydrogen is formed. This, therefore, if used on a large scale, offers the means of removing the sulphur from coal gas; since we can transfer the sulphur from its combination with carbon—in which form we have no more convenient reagent than calcium sulphide for arresting it—into a combination with hydrogen, which we are able to remove by means of oxide of iron.

The experiment of acting upon gas with heated surfaces was tried on a rather large scale, between two and three years ago, at the Horseferry Road station of The Gaslight and Coke Company. I have here a diagram showing two sections of an apparatus constructed by Dr. Siemens for this experiment.

The apparatus was in action for some time, but, as will happen with experimental apparatus, there were many difficulties in working it. The iron plates which separated the gas from the fire cracked, and were difficult to mend. The gas which escaped ignited, and added to the strength of the fire, and the temperature was liable to become unduly high. Also the material through which the gas passed was in too large pieces, and did not present a sufficient surface.

I have here a record of my experiments, showing that two or three times, for a week or ten days together, when passing gas through the apparatus at the rate of 10,000, or even 20,000, cubic feet an hour, I succeeded in reducing the amount of sulphur from 30 or 40 grains to between 10 and 15 grains per 100 cubic feet of gas. But after these short periods of successful working the purifying effect gradually diminished.

I think that probably this disappointing result arose from the difficulty of managing the temperature of the apparatus, and the ill effect of heating it too strongly—viz., a deposition of carbon upon the materials with which it was filled. The amount of this deposition of carbon was not such as to produce any prejudicial effect on the illuminating power of the gas, but it affected the surface of the material which was used to act upon the gas, and rendered it much less efficient for the purpose.

I have made, since that experiment was terminated, a good many more laboratory experiments on the same subject, especially to ascertain what material was most favourable for the purpose, and I find that the quantity of the substance which it is necessary to heat, and also the requisite temperature, may be very much reduced by having a different material, and that in a form more favourable to the action of its surface and the equable distribution of the gas current. I have made recently a number of experiments with a material made into what appears to be the most convenient form—viz., little balls, and consisting of a mixture of clay and oxide of iron, the latter of which is changed, when thus heated in the presence of coal gas, into metallic iron. The particles of iron thus formed being separated by being mixed with clay, do not fuse and run together, as iron which is heated in gas containing sulphur is apt to do if its particles are contiguous one to another, but are kept apart in a state of fine division, and thus present a large surface. The quantity of gas that can be purified by a very small quantity of this material is really very remarkable. I have made quantitative experiments, using only the small amount of material which I have in such a bulb as this, containing about 2 cubic inches, or somewhat less. I have passed the gas through this bulb, heating it in the manner shown, measuring the rate at which it passes, collecting it, and then ascertaining how far the sulphur in that gas was reduced.

I tried, first, whether making these balls of clay only would answer the purpose, and I found that for a moderate rate of passage of the gas, clay answered fairly well; but when I forced a larger quantity of gas through the small bulb the effect diminished. I then tried the mixture I have described, of clay and iron, and with this I found that I could purify gas as fast as, with the pressure at my command, I could send it through the bulb. On sending the gas through at the rate of between 9 and 10 cubic feet an hour, which, considering the quantity of material used, is very fast indeed, the purification effected is as great, with that rapidity of passage, as it is with a lower rate.

After streaming through the contents of the bulb, the gas was purified from the sulphuretted hydrogen which is formed, by passing it through a small tube containing oxide of iron. When balls of clay were used, and a small quantity of gas passed through, the amount of sulphur remaining was only 9 or 10 grains; but when a larger quantity was sent through—namely, 6, 7, 9½ cubic feet per hour—then gradually the effect diminished, and almost disappeared. But with balls of clay and iron, even with this large quantity of gas passing through, the effect was always uniform, and the amount of sulphur, which, as it entered the apparatus, was between 30 and 33 grains per 100 cubic feet, was uniformly reduced in all my experiments to between 9 and 10 grains per 100 cubic feet.

I have, of course, been alive to the danger of this effect being a transient one. Some weeks of continuous heating and passage of gas have not impaired it, and I am now engaged in pushing the trial further. I hope to find that the lower temperature which, with this material, is sufficient for the destruction of carbon bisulphide, may be low enough to cause no deposition of carbon from the gas. Experiments on a large scale are difficult and costly to make; but my belief is that, if I could place in the top of the large experimental apparatus such a material as I now use, it would purify a much larger volume of gas than was actually sent through it. It is easy to calculate, from the experiment on a small scale, what should be the effect of using the same material on a larger scale—that is, how much gas should be purified, if, instead of employing these two cubic inches, I employed, say, a cubic yard. I find, making this calculation, that to purify the winter make of gas of some of the largest London gas-works, such as 5½ million cubic feet a day, it would only be necessary to use one cubic yard of such material—that is to say, a quantity which could most easily have been placed in the top of the apparatus that I had in use.

There is one other point I wish to refer to—namely, the effect of carbonic acid in gas upon the purification of gas from sulphur by the action of calcium sulphide. It was pointed out a few years ago, I believe by more than one person at about the same time, that the main reason why the purification of gas from sulphur by the action of lime showed so great a want of uniformity was, that the calcium sulphide—the chief purifying agent—was liable to be decomposed by the carbonic acid of the gas. What was necessary for effective purification was, that lime should be used in sufficient quantity to remove the carbonic acid wholly, in the first purifiers, so that some of the purifiers should contain undecomposed calcium sulphide which would then retain the bisulphide of carbon. I made, at that time, some experiments upon the effect of carbonic acid on calcium sulphide, which had been used to purify gas from sulphur and the results I think are still interesting. I first prepared some calcium sulphide, and used it to purify gas, which it did very effectually, down to 10 or 12 grains per 100 cubic feet for some weeks together, the carbonic acid in the gas being carefully removed before the gas entered the tube filled with calcium sulphide. I then allowed gas to pass through, containing carbonic acid, and pushed the experiment further by adding carbonic acid to the gas. The issuing gas then contained a very large quantity of sulphur indeed. The gas freed from carbonic acid showed only some 10½ grains per 100 cubic feet. When I passed through the same material gas to which I had added a little carbonic acid, I found 68½ grains per 100 cubic feet. I pushed the experiment further, adding a larger quantity of carbonic acid, and found 135 grains of sulphur. With still more carbonic acid I got as much as 245 grains of sulphur given off. Crude coal gas may occasionally contain a considerable quantity of carbonic acid. So there can be no doubt that the cause assigned for the fluctuations in the amount of sulphur when lime was used in insufficient quantity is a true cause, and that the very large quantities of sulphur sometimes found in gas result from carbonic acid being allowed to go forward in the lime purifiers, and so to set free the sulphur which has been removed by the lime from a previous quantity of gas.

In the next and concluding lecture I propose to speak of those ingredients of coal gas which are most important for their heating and illuminating properties.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The week has again been a quiet one in most respects, although there have been throughout some very persistent and disquieting rumours of further forthcoming failures in two or three branches of business.

In pig iron the current transactions are on a moderate scale only, and prices are only just maintained, owing, to a great extent, to the weakness of other markets. Forge pig is selling rather more freely for the Leeds and Wakefield districts, but it is not coming here at all freely. Foundry numbers are in steady request, although it cannot be said that the parcels which are changing hands are very bulky. Producers of all sorts of pig iron appear quite willing to sell a month or so ahead, but they do not care to bind themselves for long forward deliveries at the present prices.

In merchant iron there has been a drop of 10s. per ton by some of the vendors of medium bars, but no general reduction has been declared, nor is it likely to be announced now that the quarterly meetings have passed over without producing the change so much needed. In the brass foundries, and generally in the brass-works of Sheffield, Rotherham, &c., there is a fair amount of work in course of being executed, but there is not any activity in the proper sense of the word, nor do the order-books promise any great improvement in the immediate future. Water fittings appear to be in best request at the leading works.

In the coal trade there is no quotable alteration of prices, the tendency of all kinds of house fuel being downwards. Steam coal is unchanged by the mutual combination of its vendors; but gas coal and slack are rather firmer, although I do not anticipate that the former will become appreciably dearer during the summer. At several of the South Yorkshire collieries there are strikes, and in Derbyshire some pits are being temporarily closed.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The coal trade generally continues in a depressed condition, and although the recent stoppage of many of the pits for the holidays tended to reduce temporarily some of the surplus stocks lying in waggons on the pit sidings, supplies are still generally abundant in the market, and there is every prospect of low prices ruling during the summer. So far as gas-making coals are concerned, although the price of cannel may not be materially affected, it seems probable that consumers of ordinary descriptions of gas coal will be able to place their contracts on favourable terms, as round coal has been so plentiful this winter that holders will be anxious to secure orders, if only to enable them to meet the requirements of their customers for slack, for which they are now able to command fair prices. The average pit quotations at present are without material alteration, and may be given about as under:—Good Arley, 9s. 6d. to 10s. 6d. per ton; Pemberton four-feet, 8s. 6d. to 9s.; common coal, 6s. 6d. to 7s. 6d.; burgy, 5s. to 5s. 6d.; and slack, 3s. 9d. to 4s. 9d. per ton, according to quality.

The grievances which the coal merchants of this district have against the railway companies were brought before a meeting of the recently-formed Lancashire Coal Traders Association, held in Manchester last Tuesday. One point of complaint dealt with was the unreasonably short time which the companies allowed for loaded waggons to stand on the sidings before charging for demurrage, and it was strongly urged that not less than four days, exclusive of the day of arrival, should be allowed. Another grievance was the frequent delays which occurred in the transit of coal from the pits, and upon this question it was urged that the railway companies should be made liable for all loss arising therefrom.

In the iron trade there has been little or nothing doing, but prices are without material alteration, as makers are unable to do legitimate business at lower rates than they have been quoting. For finished iron there have been a few inquiries, but there have been very few orders given out. Manufacturers are, in some cases, pushing keenly for business, but the current market rates remain at from £6 15s. to £7 per ton for bars, according to quality. Founders are very slack, and it is the same with engineers, except in one or two shops here and there, which have special work on hand.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

At the ordinary monthly meeting of the Town Council of Dumfries, held on the 9th inst., the clerk reported that in terms of the resolution of the meeting held on the 2nd ult., he had made the publication directed by the Gas Act in the three local newspapers, and also in a placard throughout the burgh during the month, and that no remonstrance against the adoption of the Gas Act had been lodged with him by any ratepayer, and that therefore there was now nothing in the way of the resolution of the council being carried out. Bailie Nicholson was of opinion that there had been a virtual adoption of the Act by the burgh, but the clerk said it still required to be registered before it could be said to be completely adopted, but that could be done at any time, should the council resolve to apply the Act. He said he had received a notice from Bailie Wood that at next meeting he would move that the council, as commissioners under the Burghs Gas Supply Act of 1876, resolve to exercise the powers conferred upon them by the said Act, and give notice to the Dumfries Gas Company that they were prepared to treat for the works, lands, and plant of the company, on terms to be mutually agreed upon, or to be fixed by an arbiter, as provided for by the Act. On the motion of Bailie Nicholson, seconded by Mr. Johnston, it was agreed to get the Act registered preparatory to Bailie Wood's motion being considered.

A special meeting of Police Commissioners of Johnstone was held on the 5th inst., to consider and decide upon the further proceedings to be taken under the Burghs Gas Supply (Scotland) Act. The clerk read a copy of the minute of registration of the adoption of the Act by the commissioners, in the sheriff books of the county of Renfrew, by Sheriff Cowan. The next step was the appointment of a Gas Committee, and, on the motion of Provost Shanks, it was unanimously resolved that the said committee should consist of the whole of the commissioners.

Many persons connected with the manufacture and supply of gas in other large towns throughout the kingdom, and possibly even abroad, may feel interested in being enabled to inspect the following table, which represents the quantity of gas manufactured annually in Glasgow from 1827 to 1875:—

Year.	Quantity of Gas made, in Cubic Feet.	Year.	Quantity of Gas made, in Cubic Feet.
1827	79,234,910	1857	697,378,000
1832	100,068,200	1862	821,849,000
1837	162,605,800	1867	1,119,842,000
1842	198,522,500	1872	1,559,190,000
1847	391,353,000	1875	1,649,616,000
1852	505,285,000		

It may be noticed that there was no very material increase in the period from 1872 till 1875, but the explanation of that circumstance lies in the fact that it is since 1872 that the Partick, Maryhill, and Hillhead Gas Company commenced to supply gas over a large area that would otherwise have been included in the Glasgow supply, including suburban districts, whose population has increased enormously during the last few years. I think I am quite safe in saying the consumption of gas, in proportion to the population, is not so great in any other large town in the kingdom as it is in Glasgow.

The illuminating power of the gas supplied to Greenock during the month of March was equal to an average of 28·96 standard candles.

On Tuesday last the Glasgow Corporation 6¾ per cent. Gas Annuities brought an advance of 15s. at 168, and on the following day the 9 per cent. Gas Annuities changed hands at a rise of £1 at 224.

On the 6th inst. a number of the Kirkintilloch Gas Company's shares were sold by public auction. In lots of three shares each, the £5 shares brought respectively, £10 4s., £10 9s., and £10 11s. per share. These shares were originally £5 shares, and the highest price ever previously attained was £8 10s. about two months ago.

At a recent meeting of the Glasgow Corporation Gas Committee it was resolved to make very considerable extensions to the coal storeage accommodation at the Tradeston and Dalmarnock Gas-Works. The estimated expense in the one case is about £6000, and, in the other, about £5800.

It was reported at the last monthly meeting of the Broughty Ferry

Police Commissioners, that the average quality of the gas supplied to the burgh during the month of March was equal to 28·17 candles.

The Police Commissioners of Paisley have lately received a report (long expected) from Mr. Leslie, C.E., as to the drainage of the town. Three plans have been proposed—irrigation, filtration, and precipitation—and Mr. Leslie recommends the latter, which would cost in all £83,000. One of the commissioners had no doubt it would mount up to £100,000. It was agreed to print the report for the convenience of the commissioners.

The town of Montrose was supplied with an average of 301,000 gallons of water per day during the month of March, and the rainfall only amounted to 1·4 inch, as against 2·24 inches at Aberdeen, 2·67 inches at Edinburgh, 4·38 inches at Greenock, and 2·5 inches at Dundee. The rainfall at Paisley was also 1·4 inch. At the Glencorse reservoir (Edinburgh Water-Works) the rainfall amounted to 16·90 inches from the 1st of January to the 10th of April, as against 14·00 inches over the same period in 1876, and 8·85 inches in 1875. The supply of water to Edinburgh, during the fortnight ending the 10th of April, was 28·99 gallons per head per day to a population of 281,200.

Pig iron was selling at 54s. on Monday last, and again on Friday forenoon, but the market closed in the afternoon with business reported at 53s. 9d. one month, buyers offering 53s. 8d. cash.

There has been a little more activity in the coal trade during the past week, owing chiefly to the temporary demand for the Quebec fleet. Prices, however, have not experienced any improvement.

Society of Arts, Chemical Section.—The lecture on Thursday next will be by Charles W. Vincent, F.R.S.E., F.C.S., "On Spontaneous Combustion in Factories and Ships."

Glasgow Water Supply.—Dr. Mills, of the Andersonian University, Glasgow, reports that during last month the water supplied to that city from Loch Katrine was of a very pale brown colour, and contained abundance of fine muddy particles, with some fibres and hairs. The hardness was the highest yet recorded of this water (1·4°).

Reductions in the Price of Gas.—It was stated in the Journal of the 3rd inst. that the Leamington Priors Company had agreed to make a reduction of 3d., which would make the price of gas 4s.; it should have been 3s. 9d. The Pembroke Docks and Town Gas Company, Limited, announced a reduction to 5s. per 1000 from the 1st inst.

Wallasey Local Board.—Lieut.-Col. Cox, R.E., held an inquiry at Egremont, on Wednesday last, relative to a recent application of the Wallasey Local Board for a Provisional Order to enable them to borrow £45,000 for gas and water purposes, and £125,000 on account of new ferry works, including £50,000 for new boats. It was stated that the board previously had powers to borrow £50,000 for water, and £40,000 for gas.

Hull Gas Supply.—Mr. Baynes reports that the gas sent into the Sculcoates and Myton district, during March, by the British Gas Company gave the following results, sulphuretted hydrogen and free ammonia being at no time present to the ordinary tests:—

	Max.		Min.		Mean.
Illuminating power standard sperm candles	16·05	..	15·28	..	15·63
Grains of sulphur per 100 feet	30·50	..	28·40	..	29·68

Mean barometer and temperature in experiment-room: Bar., 29·82; temp., 56°. In the east district, Mr. J. Baynes, jun., makes the following report:—

	Max.		Min.		Mean.
Illuminating power standard sperm candles	16·35	..	15·48	..	15·83
Grains of sulphur per 100 cubic feet . . .	—	..	—	..	18·92
Grains of ammonia per 100 cubic feet . .	—	..	—	..	12·72

Mean barometer and temperature in experiment-room: Bar., 29·52; temp., 56·5°.

Accident at the Pickering Water-Works.—On Monday, the 9th inst., the reservoir belonging to the Pickering Gas and Water Company, situated in the Whitley Road, some quarter of a mile above the town, was finished. The reservoir, which is to supply the town, and holds 100,000 gallons of water, appeared all right on Wednesday night at 8 p.m., when the manager left it. Early yesterday morning, however, it was found that during the night the whole of the roof had fallen in. The outer walls, fortunately, remain quite safe, or the town would have been flooded. It is supposed that one of the iron girders supporting the roof has given way, but the exact cause of the accident cannot yet be ascertained.—*Leeds Mercury.*

North of England Gas Managers Association.—The managers and other gentlemen connected with the gas companies of the North, taking advantage of the opportunity afforded by the exhibition of gas apparatus at South Shields, met yesterday in the board-room of the South Shields Gas Company. Mr. W. H. Atkinson, the secretary to the Tynemouth Gas Company, who is the oldest gas manager in the district, occupied the chair. On the motion of Mr. Ford, seconded by Mr. Whyte, it was resolved—"That it was desirable to form an association, to be called the 'North of England Gas Managers Association,' to consist of managers and those connected with gas undertakings situate in the counties of Northumberland, Durham, Cumberland, Westmoreland, and the north of Yorkshire." Mr. Ford moved, Mr. Studholme seconded, and it was carried unanimously, that Mr. W. J. Warner, the engineer of the South Shields Gas Company, be the first president of the association. Mr. J. Hepworth, of Carlisle, was appointed vice-president. Other business was transacted; and it was agreed to hold the next meeting in Newcastle.—*Newcastle Daily Journal.*

Gas Bills in the House of Commons.—Mr. Alfred Frisby writes to *The Times* as follows:—"It is 7 per cent., and not 10 per cent., which is, and has for some years past been, fixed as the limit allowed to be divided on the capital." Mr. Frisby admits that the clause proposed by Mr. Raikes was inserted last year in the Acts of certain gas companies of the metropolis; "but," he says, "this was only in conjunction with another clause not proposed to be applied to other gas Bills, whereby a reduction of the price charged to consumers below a certain limit involved a possible raising of the dividend payable to shareholders. I wish to add two, among other, material objections to the application of the principle. The first is, that such a radical change, affecting interests to the amount of about one hundred million pounds, ought not to take effect without giving considerable notice—say three years—to all parties involved. The second is, the fear whether its ultimate adoption will not prove more hurtful by checking enterprise in the origination of new companies than the relief, which I do not deny that it will afford, though in a very considerably less ratio than was stated, to the public in connexion with existing undertakings."

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1339.—Cryer, J. W., and Button, G., Kingston-upon-Hull, Yorkshire, "Improvements in reflecting surfaces for increasing the illuminating or lighting power of gas and other lights." April 6, 1877.

1407.—Kennedy, W. W., Glasgow, "Improvements in taps, cocks, or valves, the same being in part applicable to water-gauges and analogous apparatus." April 11, 1877.

1415.—Kunkler, E., Lenzburg, Switzerland, "A self-closing tap or valve." April 11, 1877.

1426.—Price, W., Gas-Works, Hampton Wick, "Improvements in screens." April 12, 1877.

1428.—Johnson, R., Seedley, Lancs, "Improvements in machinery for pumping, forcing, blowing, and exhausting air and other fluids." April 12, 1877.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3965.—Steel, J., Glasgow, "New or improved apparatus for purifying and condensing gas, and for extracting and collecting ammonia therefrom." Oct. 13, 1876.

4036.—Vandendriesche, A. E., Lombard Street, London, "An improved gas-regulator designed for the purpose of being applied to burners of every description without altering the original appearance of the fittings." A communication. Oct. 19, 1876.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1168.—Russ, E., "Improvements in the construction of taps or cocks for liquids." April 4, 1874.

1171.—Short, T., "Improvements in apparatus for purifying sewage." April 4, 1874.

1176.—Pearson, E., "Improvements in taps, cocks, or valves, for adjusting or regulating the flow of liquids and gaseous fluids." April 4, 1874.

PATENT WHICH HAS BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

1014.—Young, W., and Prash, P., "Improvements in the manufacture of illuminating gas." April 6, 1870.

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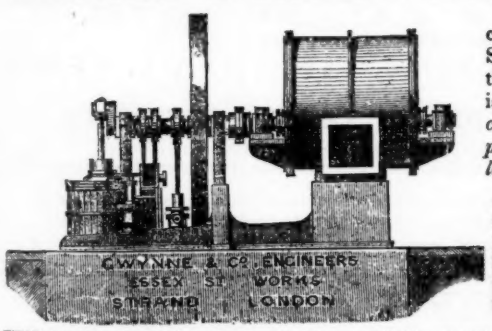

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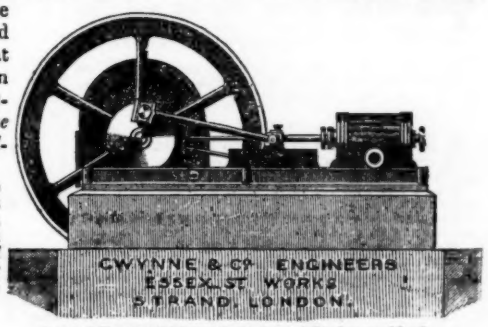

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WANTED, by an experienced Wood Sieve and Scrubber Maker, a SITUATION, in a Gas Factory preferred.
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WANTED, a Second-hand Gasholder, with columns, girders, &c., in good condition, about 30 feet in diameter, with or without cast-iron tank.
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WANTED, by a Lancashire Manufacturing Chemist, large or small quantities of strong Gas AMMONIACAL LIQUOR, above 6° Twaddel.
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FOR SALE, by Tender, a second-hand GASHOLDER, 35 ft. diameter by 18 ft. deep.
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Apply to S. STUDHOLME, Gas-Works, WHITEHAVEN.

FOR SALE, price £70, a 4-horse power Lenoir GAS-ENGINE, in good order.
It is at work about four miles from here, and can be seen by applying to THOS. MAY, Manager, Gas and Water Works, CANTERBURY.

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TO BE LET or SOLD, a Property in the vicinity of London, admirably adapted for the erection of Water-Works, having an abundant supply of the purest spring water from the chalk.
For further particulars, apply to DRIVER AND HAYWOOD, 5, Victoria Street, WESTMINSTER, S.W.

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FOR SALE, as they now stand, and at any reasonable price, as the ground upon which they stand is wanted, four 12-ft. square Cast-Iron PURIFIERS, with centre-valve and connexions, grids, tee bars, &c., complete.
Apply to Mr. E. BAKER, Engineer, Gas-Works, READING.

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FOR SALE, Three Engines and Ex- hausters (Two by Gwynne, and one by Waller) for 15,000 feet per hour. Being about to be replaced by larger ones.
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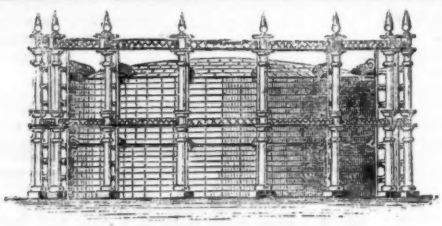

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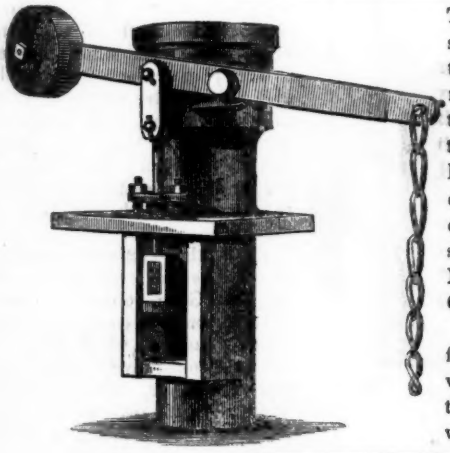

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TO BE SOLD by PUBLIC ROUP, within the Town-House, Inverkeithing, on THURSDAY, April 19, 1877, at Two p.m., the INVERKEITHING FIRE-CLAY WORKS, near to the Town of Inverkeithing, as the same have been carried on for many years by the late Mr. Fraser, together with the goodwill of the business.

The works adjoin the Great North Road. The Dunfermline and Queensferry Railway passes within a few yards, and a connexion can easily be formed. The Halbeath and Inverkeithing Railway intersects the works, and affords direct communication to the coal-fields and Inverkeithing Harbour, which are at a short distance.

Fire-clay abounds in the neighbourhood.

The works and their connexions occupy about Two acres, and are in all respects complete. They include a serviceable engine of 12-horse power. There is also an excellent Manager's house.

A large business has been carried on in these works for about 50 years, and they have attained a high reputation, more especially for gas-retorts, for which orders are received from all parts of the world, and largely from London.

The whole plant and stock-in-trade will be made over to the purchaser at a valuation. Entry on the 1st of May.

Upset price, £2000; Feu-duty, £2 15s.

For further particulars apply to JOHN ROSS, Writer, DUNFERMLINE.

WIDNES GAS-WORKS.

THE Gas Committee of the Widnes Local Board are prepared to receive TENDERS for the supply of about 9000 tons of GAS COAL, to be delivered at their Works, in such quantities and times as may be required during the Twelve months from July 1, 1877, to June 30, 1878.

Conditions and forms of tender may be obtained from the undersigned.

Tenders to be addressed to the Chairman of the Gas and Water Committee, endorsed "Tender for Gas Coal," and delivered at the Public Offices, Widnes, not later than Thursday, the 26th of April.

The Committee do not bind themselves to accept the lowest or any tender.

HENRY ROBERTS.

Gas-Works, Widnes, April 11, 1877.

TO CHEMICAL MANUFACTURERS, TAR DISTILLERS, AND OTHERS.

THE Chorley Commissioners are pre- pared to receive TENDERS for the purchase of their surplus TAR and AMMONIACAL LIQUOR for One or Three years from the 16th of October next.

The Commissioners will deliver the goods at the Chorley Railway Station into waggons to be provided by the Contractor.

Particulars may be obtained on application to Mr. Thomas Hamer, Gas Manager, Chorley, Lancashire.

The Commissioners do not bind themselves to accept the lowest or any tender.

Sealed tenders to be sent to the undersigned not later than the 15th of May next.

By Order,
RICHARD JACKSON, Solicitor,
Clerk to the Chorley Commissioners.

Dated the 6th of April, 1877.

ULVERSTON LOCAL BOARD.

GAS AND WATER DEPARTMENT.

THE Gas and Water Committee invite TENDERS for the supply of 1500 tons of COAL and 350 tons of CANNEL, for gas purposes, to be delivered in such quantities, and at such stated periods, as may be required during the Twelve months ending June 30, 1878.

The Coal and Cannel offered are to be the best of their kind, and must be as free as possible from all bats, pyrites, and dirt. Parties tendering must give full particulars of the Coal and Cannel offered, and the colliery from which they propose to supply, and state the price per ton delivered carriage paid to Ulverston Station.

Where a tender is received for the supply of both Coal and Cannel, it must be understood that the Committee is to be at liberty to accept a portion of each tender.

Sealed tenders addressed to the undersigned will be received until the 23rd inst.

JNO. SWAN, Engineer and Manager.

April 4, 1877.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

NOTICE is hereby given that the ORDINARY GENERAL MEETING of the SHAREHOLDERS of the above Company will be held at the Offices of the Company, No. 30, Gracechurch Street, in the City of London, on TUESDAY, the 8th day of May next, at Three o'clock in the afternoon precisely, to receive the Directors Report and the Accounts of the Company for the half year ending the 31st day of December last, to declare a Dividend, to elect Directors and an Auditor in the place of those retiring by rotation, and to transact the general business of the Company.

The Transfer Books will be closed from the 24th inst. to the 8th of May, both inclusive.

By order of the Board,
ALFRED LASS, Secretary.

Offices, 30, Gracechurch Street, London,
April 10, 1877.

PAMPHLET ON GAS.

COOKING AND HEATING.
HINTS ON GAS-BURNERS, &c.

For GAS COMPANIES to distribute to their Gas Consumers.

Specimen Copy by post Threepence, from the Author,
MAGNUS OHREN, Gas-Works, Sydenham, S.E.

BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Corporation are prepared to receive TENDERS for the purchase of the surplus GAS TAR up to the 31st of October next (about 1000 tons).

Further information and forms of tender may be obtained on application to Mr. Wm. Carr, Engineer, Gas-Works, Halifax, and tenders, properly endorsed, may be sent to me on or before Thursday, the 19th day of April, 1877.

By order,
A. C. FOSTER, Town-Clerk.

Town-Hall, Halifax, April 6, 1877.

BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Corporation are prepared to receive TENDERS for the purchase of the whole of the AMMONIACAL LIQUOR manufactured on their premises for a period of One, Two, or Three years. The Liquor to be delivered either into railway tanks or canal barges, as the Contractor may desire.

Further particulars and forms of tender may be obtained on application to Mr. Wm. Carr, Engineer, Gas-Works, Halifax, and tenders, properly endorsed, must be sent to me on or before Thursday, the 3rd day of May, 1877.

By order,
A. C. FOSTER, Town-Clerk.

Town-Hall, Halifax, April 6, 1877.

TO MANUFACTURING CHEMISTS.

THE Macclesfield Corporation Gas Committee are prepared to receive TENDERS for the purchase of the TAR and AMMONIACAL LIQUOR made at their Gas-Works for a period of One, Two, or Three years, dating from May 1, 1877, at the option of the Committee.

Sealed tenders to be delivered at the Town-Hall, Macclesfield, not later than Saturday, April 21, 1877, endorsed "Tender for Tar and Ammoniacal Liquor," and addressed to the CHAIRMAN of the Gas Committee, Town-Hall, Macclesfield.

The Committee do not bind themselves to accept the highest or any tender.

March 27, 1877.

HONITON GAS AND COKE COMPANY.

TENDERS are invited for a Lease of the works of the above Company, situate at Honiton, in the county of Devon.

Quantity of gas made last year, as returned by the present lessee, 4,000,000 cubic feet.

The term of the Lease will be for Ten years, from Midsummer, 1877.

Further particulars may be obtained on application to the Secretary.

A draft of the Lease may also be seen.

Sealed tenders to be addressed to the Secretary on or before May 1, 1877.

JOHN MURCH, Secretary.

Honiton, March 22, 1877.

BOROUGH OF SOUTHPORT.

CONTRACT FOR IRONWORK.

THE Corporation are prepared to receive TENDERS for the supply and erection of certain Cast-Iron Columns, Girders, and Roofs at their Gas-Works, near Southport.

Drawings and specification may be seen at the Town-Hall, Southport, and at the Office of Mr. George Anderson, 35a, Great George Street, Westminster, on and after the 12th inst.

Tenders to be sent to me, endorsed "Tender for Gas-Works," on or before the 26th inst.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
KEIGHLEY WALTON, Town-Clerk.

BOROUGH OF SOUTHPORT.

CONTRACT FOR RETORTS & FIRE-CLAY GOODS.

THE Corporation are prepared to receive TENDERS for the supply of RETORTS and FIRE-CLAY GOODS required at their new Gas-Works, near Southport.

Drawings and specification may be seen at the Town-Hall, Southport, and at the Office of Mr. George Anderson, 35a, Great George Street, Westminster, on and after the 12th inst.

Tenders to be sent to me, endorsed "Fire-Clay Goods," on or before the 26th inst.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
KEIGHLEY WALTON, Town-Clerk.

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CONTAINS

An Alphabetical List of Towns in England having Gas or Water Companies.
Date of Formation of the Company.
If Incorporated under Special Act of Parliament, and the date of such Act or Acts.
If under any of the Limited Liability Acts.
Amount of Share Capital.
Name of Chairman.
Name of Engineer or Manager.
Name of Secretary.
If Let on Lease, Name of Lessee.
If a Private Venture, Name of Owner
If Purchased by the Corporation (and in cases where possible the date of such Purchase), or if the Property of the Local Authorities.
Population of all Towns.
Railway Communication, and the Distance from London.
Special Notice is taken of all the Members of the "British Association of Gas Managers."

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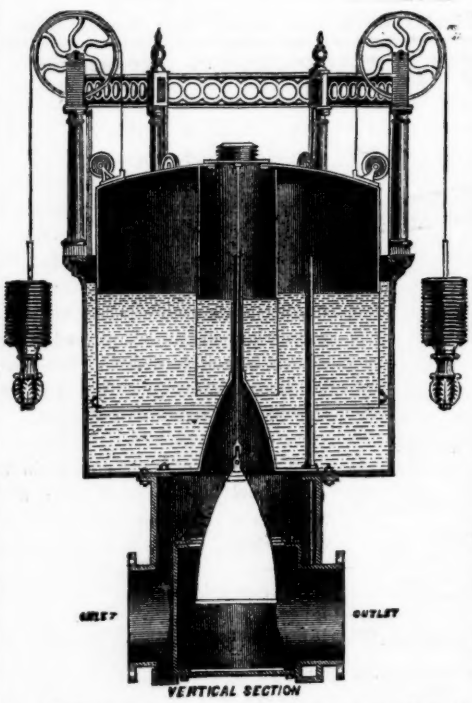

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The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

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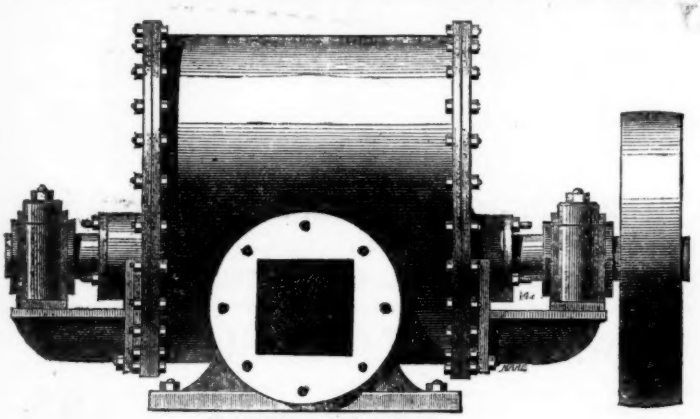

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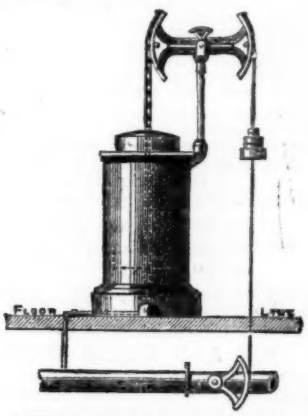
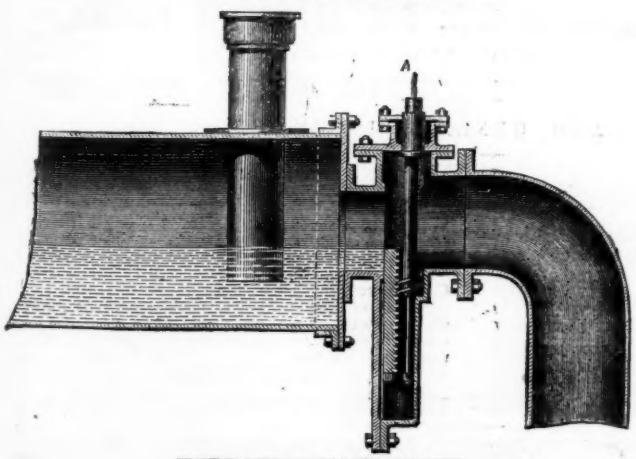
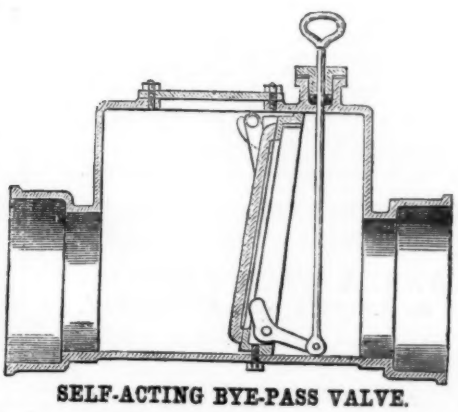


HYDRAULIC REGULATOR.



HYDRAULIC MAIN VALVE.



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JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. Romans has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

Analysis and Prices forwarded on Application.

B. GIBBONS, Jun.,

DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,

STOURBRIDGE (Established 1834),

MANUFACTURER OF EVERY DESCRIPTION OF

Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts,

A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
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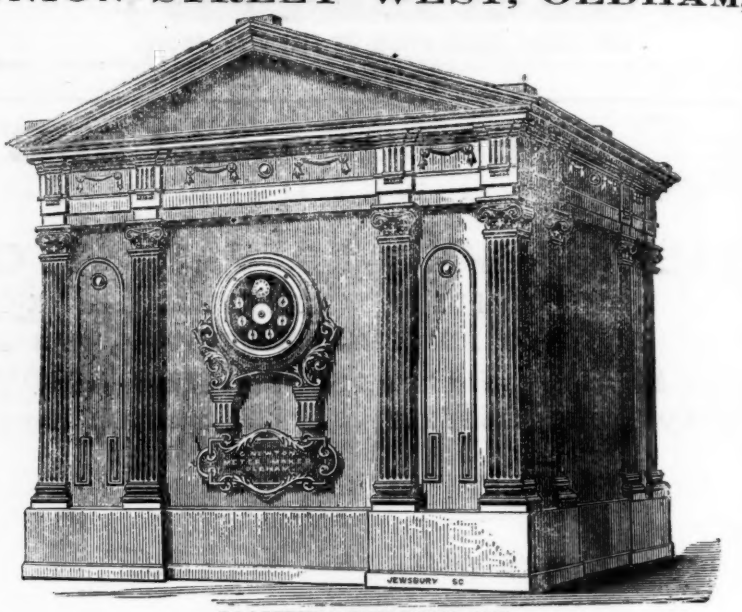
Special attention given to the execution of Export Orders.

GEORGE NEWTON,

UNION STREET WEST, OLDHAM,



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WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

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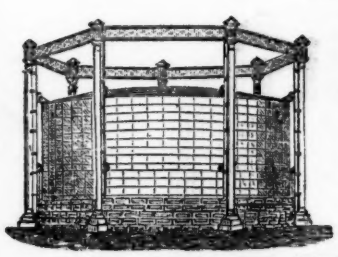

S. C. and Sons undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works,** for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs,** and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers,** and **Purifiers,** of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**

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SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.

THE WIGAN COAL & IRON COMPANY,
LIMITED.

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

GAS PURIFICATION & CHEMICAL Co., LIMITED.
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Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

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H. O. COOKE & CO.,
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Are now supplying the best natural Oxide of Iron that has yet been brought into the market.

ALDER AND MACKAY,
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MANUFACTURERS OF

CONSUMERS IMPROVED GAS-METERS;

IMPROVED DRY GAS-METERS, in Cast-Iron and Tin Cases,

OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

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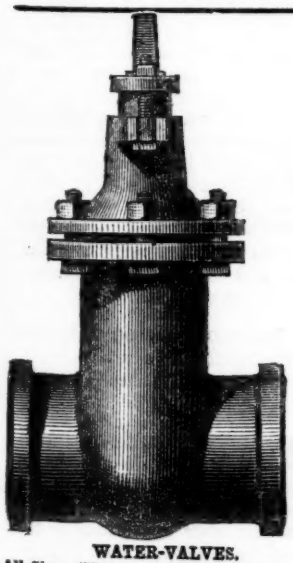

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All Sizes, Flange and Socket, kept in Stock, tested to 1000 feethead.

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ENGINE-WORKS,

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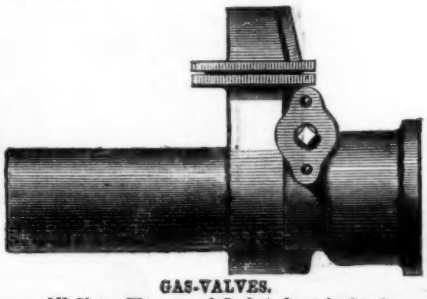
SCREW-COCKS, HYDRANTS,

SLUICES, PENSTOCKS,

And all other Machinery for

WORKS OF WATER SUPPLY, DRAINAGE AND IRRIGATION.



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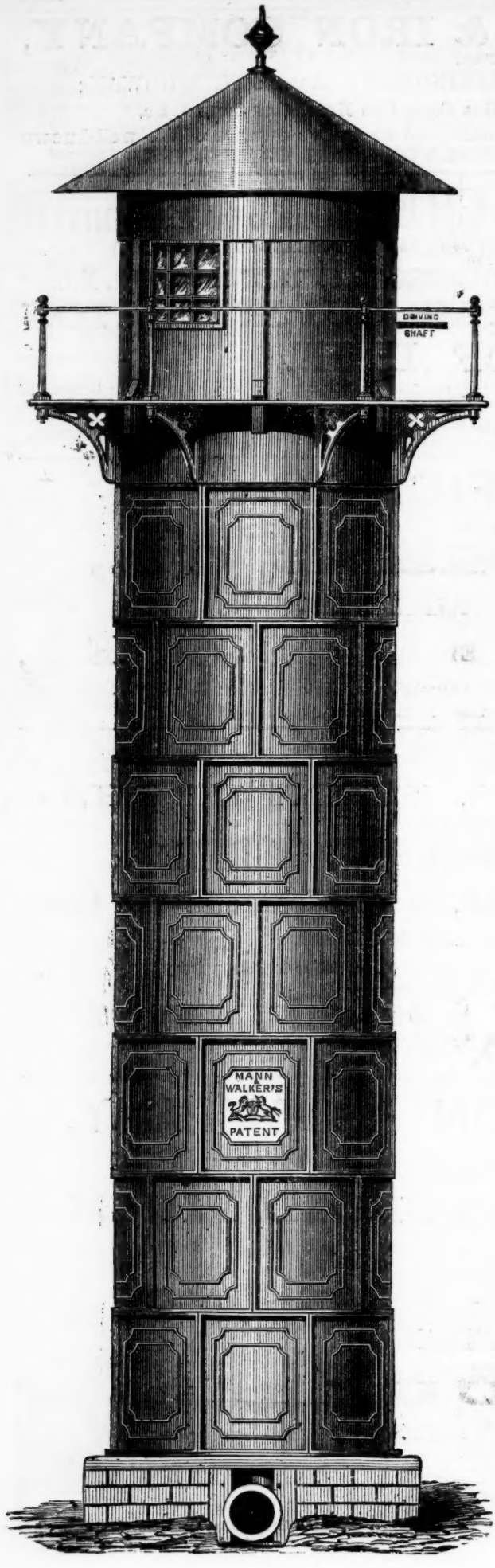
All Sizes, Flange and Socket, kept in Stock, tested to 100 feet head.



C. & W. WALKER,
8, Finsbury Circus,
London, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

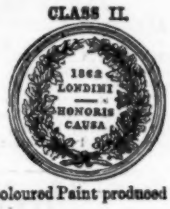
Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.



This Paint having been in general use over fifteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

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IRON AND BRASS FOUNDERS,

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London Office: 2, SUFFOLK LANE, CANNON STREET.

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MANUFACTURERS OF ALL DESCRIPTIONS OF

HYDRAULIC MACHINERY,

INCLUDING

ACCUMULATORS, FORCE-PUMPS, CRANES, & LIFTS,

FOR

GAS-WORKS, WAREHOUSES, &c.

IMPROVED HYDRAULIC MACHINERY,

Specially Arranged for Lifting and Lowering Purifier-Covers, &c.

MAKERS OF

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS;

PIPES FOR GAS AND WATER WORKS;

ROOFS, COLUMNS, AND GIRDERS.

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

ALBERT GAS COAL.

THE DERBYSHIRE

SILKSTONE COAL COMPANY,

LIMITED,

CAN OFFER A

GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,
Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
CHARLES HORSLEY, Agent.

BIRTLEY IRON WORKS,
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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

THE
SILICA FIRE-BRICK CO.,
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Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces, and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

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BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Successors to
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BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
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GAS-RETORTS, GLASS-HOUSE FURNACE, BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

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Manufacturers of all Descriptions of
BEST STOURBRIDGE FIRE-BRICKS, LUMPS, AND CLAY RETORTS
Of all Dimensions for Gas-Works,
GLASS-HOUSE POTS & CRUCIBLES
Of every kind.
The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture.

"SELLARS' CEMENT"
PREVENTS WASTE OF GAS FROM RETORTS;
SAVES CLAY RETORTS FROM DESTRUCTION BY FIRE;
GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;
And PREVENTS ALL POSSIBLE LOSS of GAS FROM LEAKAGE.
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THE GAS CEMENT WORKS,
BIRKENHEAD.

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CAST-IRON GAS AND WATER PIPES.

DELIVERY F.O.B. ON CLYDE, OR STOCKTON-ON-TEES.
Prices on application.

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PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS—giving great Economy of Fuel.
STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.
FUEL-MACHINE, for Compressing Breeze and Tar.
WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.
N.B.—Pamphlet, with Eighteen Illustrations of the foregoing, with letterpress on the construction of Gas-Works, post free, 2s. 6d.

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ESTIMATES FOR GAS-WORKS OF ANY SIZE.
REFERENCES TO 500 WORKS ALREADY ERECTED.
N.B.—All Communications to be addressed to the FIRM ONLY.

MANN & OWENS' PATENT GAS-VALVE.

EVERY VALVE WARRANTED TO BE PERFECTLY SOUND AND GAS-TIGHT.

VALVE, with Indicator for Above Ground. UNDERGROUND VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

SOLE MANUFACTURERS:
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HYDRAULIC AND GENERAL ENGINEERS,
WHITEFRIARS STREET, LONDON, E.C.
PRICES, SIZES, AND FULL PARTICULARS ON APPLICATION.

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CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 13,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17⅛ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens both in and out of Action.

Used in the principal London and Provincial Gas-Works as a great aid to the economical production of Gas.

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LESMAHAGOW CANNEL COAL.

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SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

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Has on offer, and for immediate delivery, in quantities to suit purchasers, Best Yorkshire, Derbyshire, and North Staffordshire Screened and Unscreened Gas Coals and Nuts; also Best Lancashire, Yorkshire, and other Cannel, as supplied by him to some of the principal Gas Companies in England.

Analysis and Prices forwarded on application to

HEAD OFFICES, STOURBRIDGE.

N.B.—Wanted 3000 to 5000 tons of Gas Coke.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14¼-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

THE TYNE COAL COMPANY, LIMITED, OWNERS.

W. RICHARDSON, Fitter,

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ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of

CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

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Supply to any Railway Station Best Wigan Arley Gas Coal and Nuts; best qualities of the Derbyshire, Yorkshire, and North Staffordshire Gas Coals and Nuts; also the best descriptions of Lancashire, Welsh, Scotch, and other Cannel.

Messrs. WILSON CARTER & PEARSON, being contractors to several of the principal Gas Companies in the Midland Counties, have pleasure in being enabled to give them as references.

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REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

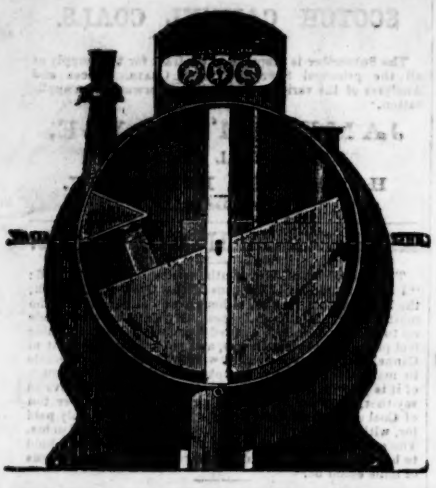
	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.



THE
UNVARYING WATER-LINE GAS-METER.
(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—THOS. G. BARLOW, C.E.

Over 120,000 in action.

MANUFACTURERS:

THE GAS-METER COMPANY, LIMITED,
KINGSLAND ROAD, LONDON;
WITH
Branch Manufactories at DUBLIN and OLDHAM.

ALEXANDER WRIGHT & CO.,
MANUFACTURERS OF
WET AND DRY GAS-METERS
OF THE BEST CONSTRUCTION AND MATERIALS,
STATION-METERS AND GOVERNORS,
STREET-LAMP METERS, BOXES, & REGULATORS,
LETHEBY-BUNSEN AND OTHER PHOTOMETERS,
AND EVERY DESCRIPTION OF INSTRUMENT FOR TESTING GAS.
PRESSURE REGISTERS AND PRESSURE GAUGES OF ALL KINDS.

55, 55A, and 56, MILLBANK STREET, WESTMINSTER, LONDON, S.W.
Price Lists on application.

R. LAIDLAW AND SON,
EDINBURGH AND GLASGOW.
Manufacturers of
CONSUMERS IMPROVED WET GAS-METERS,
THE UNVARYING WATER-LINE GAS-METERS,
IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;
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London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co. 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, April 17, 1877.